

July 1942

# TECHNOLOGY REVIEW

Title Reg. in U. S. Pat. Office



# technology review

Published by MIT

This PDF is for your personal, non-commercial use only.  
Distribution and use of this material are governed by copyright law.  
For non-personal use, or to order multiple copies please email  
[permissions@technologyreview.com](mailto:permissions@technologyreview.com).



# +25%

## FROM THE GRINDING DEPARTMENT HOW?

*It may be in your answers to these ten questions:—*

1. Am I using the most suitable wheel for the job?
2. Am I using the largest possible wheel, both in diameter and thickness, that is practicable?
3. Am I traversing the job on a cylindrical grinder when the plunge cut method might be employed?
4. What about the wheel speed? Could the speed be increased for this job in the interest of greater production?
5. Is my method of handling work the most efficient?
6. Are the measuring devices modern—of the time-saving type?
7. Are my grinding wheels trued and dressed by methods which effect economy in production?
8. Am I using the proper work speed, table speed and rate of in-feed of wheel?
9. The type and mixture of coolant is important to production. I wonder if mine is correct for the job?
10. Is the operator a suitable person, properly trained to get the most out of this job?

*Consult a Norton Engineer; he has the answers*

NORTON COMPANY  
WORCESTER, MASS.

BEHR-MANNING DIVISION, TROY, N. Y.



◀ **NORTON ABRASIVES** ▶



## ... give all your workers AO Goggles

Eye injuries that take men off jobs, even for a little while, deprive our armed forces of invaluable equipment. *In 1941, more than 9,000,000 man-days were lost by eye accidents alone.*

Don't let eye accidents occur in *your* plant. American Optical Company offers you comfortable safety

goggles for every type of industrial eye hazard . . . the services of trained safety representatives . . . a practical plan for intelligent eye protection . . . and material to help you carry out the plan. Call your AO Branch Office today for information and help.

THE American  Optical COMPANY  
SOUTHBRIDGE MASSACHUSETTS

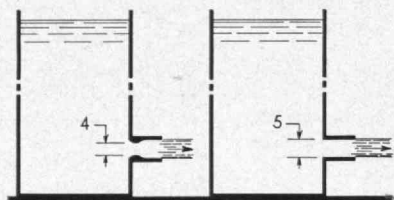


## Just for Fun!

# A CHALLENGE

### TO YOUR INGENUITY

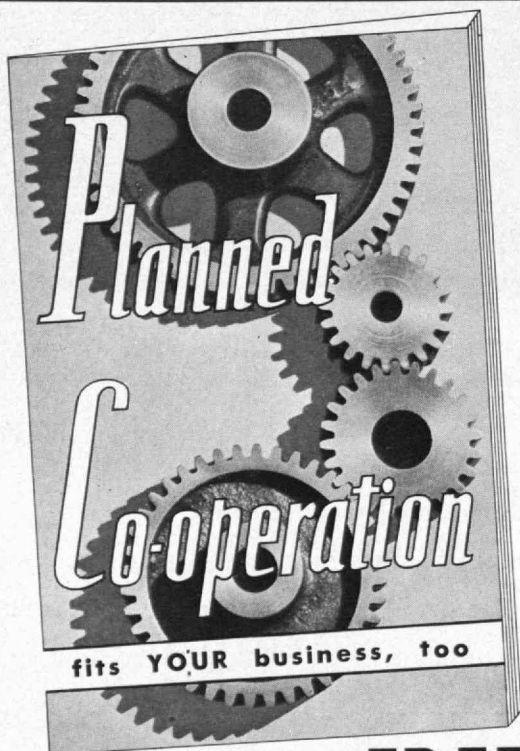
THE tall water tank at the left has, in its outlet pipe, a constriction of the approximate dimensions and form shown. What will be the change in rate of flow from the pipe if the constriction is removed, as on the right?



*Answer:* Believe it or not, the flow may actually decrease! [The water stream tends to "neck in" at the tank opening anyway, and the constriction reduces disturbing turbulence.]

We specialize in industrial physics and offer a  
"GUARANTEED RESEARCH SERVICE"

**CALIBRON PRODUCTS, INC.**  
West Orange, New Jersey



This booklet will help you cut  
printing costs.

LIBerty 3000

# FREE!

**SPAULDING-MOSS CO.**

42 Franklin St. 113 Purchase St.  
263 Park Sq. Bldg. Boston

## THE TABULAR VIEW

**Priority Paucity.** — For a survey of the rubber situation — topic of prime interest in these times — The Review has turned to GEORGE W. GRAY, skilled student of matters technological and able commentator upon them, whom *Harper's Magazine* has characterized as "perhaps the best-known practitioner in this art of scientific translation now writing in this country." Some four years ago, Mr. Gray wrote for us on microscopic studies of rubber; now, sadly enough, the adjective in that phrase may well be transposed. In preparing the present discussion (page 441), Mr. Gray received valuable material from Howard I. Cramer, Secretary of the division of rubber chemistry of the American Chemical Society; M. E. Lerner, editor of *Rubber Age*; and Loren G. Polhamus of the United States Department of Agriculture.

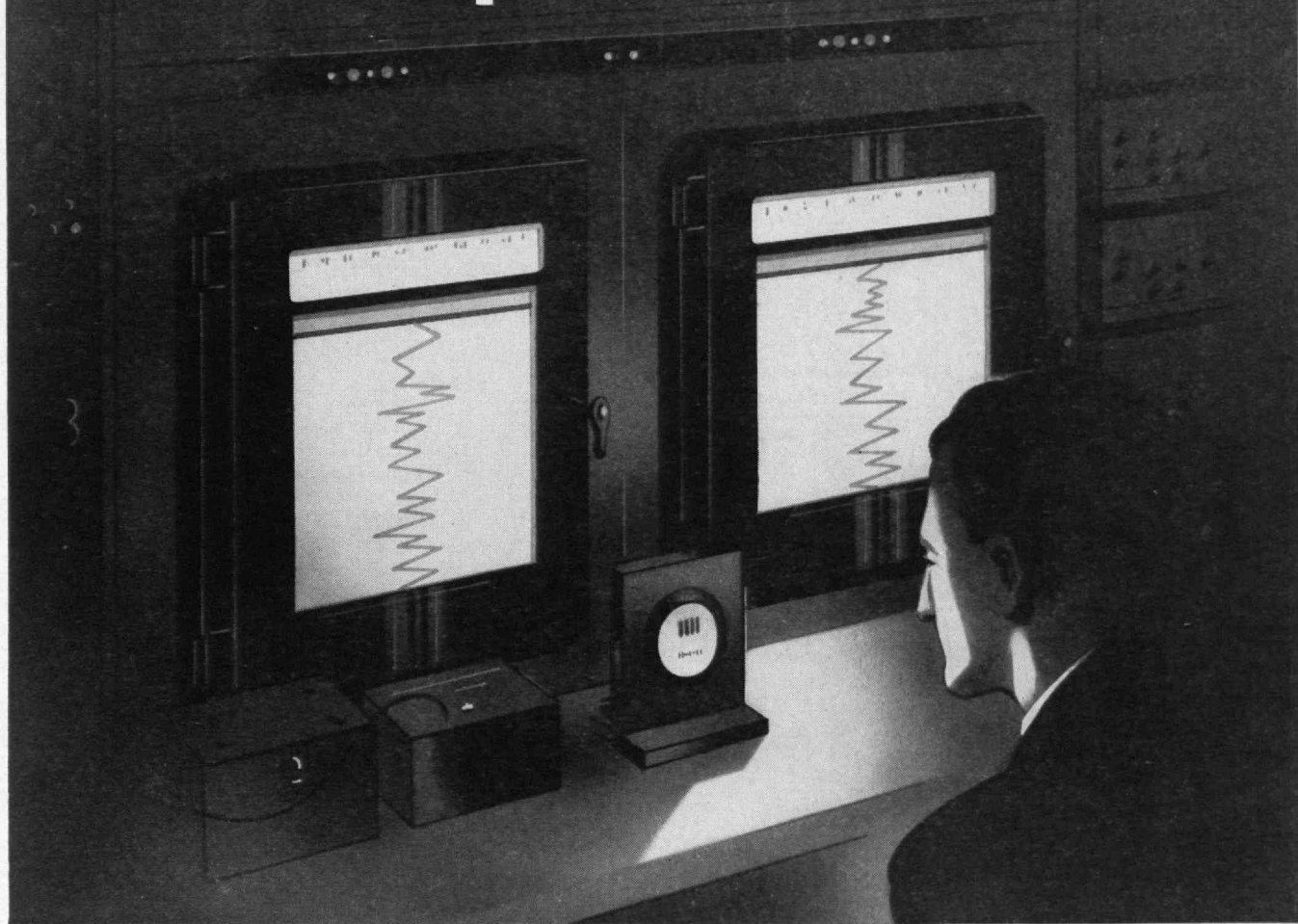
**"Company of Scholars."** — For the first time in Institute history, advanced degrees were conferred this year upon postgraduate students at exercises separate from the commencement ceremonies at which bachelor's degrees were awarded. The address that PRESIDENT COMPTON delivered upon the occasion, and which The Review publishes in full (page 444), is a farseeing analysis of the postgraduate world and the postgraduate attitude of mind.

**Forewarned, Forearmed.** — For the first issue of this volume of The Review, EDWARD R. SCHWARZ, '23, wrote with his usual vigor on a subject close to his work as professor of textile technology at the Institute. For the final issue, he discusses (page 447) a far different topic — that of sabotage. For many years actively concerned with industrial protection, Professor Schwarz is president of the Massachusetts Safety Council.

**Practice and Philosophy.** — The subject of industrial research is of fundamental importance to a country such as the United States, where millions of people rely for their livelihood upon work bred of the test tube and the experiment. How industrial research produces in practice is clear from discussion (page 449) of utilization of waste liquors in the papermaking industry. ALLEN ABRAMS, '15, who contributes this article to The Review, is vice-president in charge of research and development for the Marathon Paper Mills Company of Rothschild, Wis. How industrial research demands special attributes from its practitioners is plain in the analysis of the research mind (page 451) drawn from a chapter which JOHN MILLS, '09, contributed to a symposium on modern developments in industry, scheduled for publication under the auspices of the school of education of New York University. Mr. Mills is director of publication of the Bell Telephone Laboratories.

**Wolfpacks.** — Most timely is A. M. Low's book, *The Submarine at War*, reviewed (page 438) by HENRY E. ROSSELL, '15, Professor of Naval Construction at Technology.

## ...a rapid solution for heat transfer problems



*Information supplied by "Mechanical Engineering"*

Dr. Victor Paschkis, of Columbia University, has developed a rapid, inexpensive, and highly accurate method for the solution of heat-transfer problems.

Operation is based on the proved mathematical similarity of certain thermal and electrical phenomena. The method is accurate because easily made and recorded electrical measurements are substituted for difficult and erratic thermal measurements.

When the temperature and thermal characteristics of substances are known, solutions are quickly obtained. But the method is also applicable to substances whose thermal characteristics are unknown.

Such diverse problems as heat loss in building materials, determining the time-temperature gradients in turbine rotors, or the thermal characteristics of plastics, are quickly and accurately solved.

CLIMAX FURNISHES AUTHORITATIVE ENGINEERING DATA ON MOLYBDENUM APPLICATIONS.  
MOLYBDIC OXIDE—BRIQUETTED OR CANNED • FERROMOLYBDENUM • "CALCIUM MOLYBDATE"

**Climax Mo-lyb-denum Company**  
**500 Fifth Avenue • New York City**



## FINE PRECISION TOOLS

**For faster,  
more efficient  
production**

Micrometers  
Rules  
Combination Squares  
Bevel Protractors  
Straight Edges  
Squares  
Vernier Tools  
Gages  
Dial Test Indicators  
Speed Indicators  
V Blocks  
Calipers and Dividers

**B S** Brown & Sharpe Mfg. Co.  
Providence, R. I., U. S. A.

# BROWN & SHARPE TOOLS

**BATH  
IRON WORKS  
CORPORATION**

*Shipbuilders and  
Engineers*

**BATH, MAINE**

## MAIL RETURNS

### *War and a University*

FROM ARTHUR R. KELLER, '16:

[Editor's Note: These excerpts from a letter to President Compton from Arthur R. Keller, '16, Acting President of the University of Hawaii, summarize aspects of the effect of war on education.]

... One American university which has been seriously hit by this war is the University of Hawaii. We have been blacked out every night, all night long, since December 7. Few people realize the struggle that this young university is making, the difficulties that it is encountering. . . .

The university was closed on December 7 by order of the military governor and was permitted to reopen on February 2. Since then classes have been held during the daylight hours. About one-third of the buildings have been taken for defense or for grade- and high-school purposes, but as the university enrollment has dropped to less than one-third normal, ample space remains for classes. Some laboratories are shared with high-school classes. Many faculty members secured other work, military or defense. An accelerated program — a long summer session — is planned, but because of loss of income and lack of funds, a further cut in faculty is necessary. . . .

When trouble came on December 7, the Reserve Officers' Training Corps went out as a unit. Their departure hit the science and engineering classes. Later some students of the R.O.T.C. were deactivated, but they formed a labor battalion and went to work for the Engineers. As far as I know this is the first labor battalion. The group is composed entirely of Americans of Japanese ancestry. . . .

Carl B. Andrews, '28, has been ordered by his doctor to leave the Territory, so that all who remain of the (Concluded on page 474)

*The Review is not published during the summer months following July. This issue, therefore, concludes Volume 44. Number 1 of Volume 45 will be published on October 27 and dated November. Readers who bind their copies are reminded that if they possess nine issues of Volume 44, their files are complete. An index to the volume will be ready on August 15 and will be supplied post free upon request.*

**Speed with  
Economy**



*R. H. Macy & Co., Inc.  
Warehouse (11 contracts)*

Sound construction, speed, economy — have made 100% of our present contracts repeat orders. Something to remember when you need a new building.

**W. J. BARNEY CORPORATION**  
101 PARK AVENUE, NEW YORK  
**INDUSTRIAL CONSTRUCTION**

*Alfred T. Glasett, '20, Vice President*



## Peg Allen's new coffee maker is helping to bring down Stukas

*"I'm rushing down right now to buy another Defense Bond and get even with Hitler and the Japs! I just found out I can't get the automatic coffee maker that I've been dying to have, because the manufacturers of household appliances are making nothing but munitions. So the coffee maker and the money I'd saved will both be helping to win the war!"*

Nowhere else on earth have household electrical appliances been so numerous, so ingenious, so inexpensive as in America. When the manufacturers in this great industry turned all their resources to building munitions, they struck a heavy blow against the Axis.

But a conversion as drastic as theirs posed some knotty problems. New

designs and specifications required many new alloys, tools and methods. In cooperation with the Revere Technical Advisory staff, a number of the leading appliance manufacturers were able to change over with gratifying speed and ease. For Revere supplies industry not only with sound copper alloys, but also with a highly experienced service in the most efficient methods of using them.

Today, every ounce of copper goes directly into the essentials of modern warfare. There is none for any other use. Fortunately Revere was prepared, with new plants, advanced processes, improved equipment, to assume an important responsibility in the production of our nation's vital copper alloys. And additional facilities are steadily being added to help make victory still surer and quicker.



The Revere Technical Advisory Service functions in (1) developing new and better Revere materials to meet active or anticipated demands; (2) supplying specific and detailed knowledge of the properties of engineering and construction materials; (3) continuously observing developments of science and engineering for their utilization in production methods and equipment; (4) helping industrial executives make use of data thus developed. This service is available to you, free.

**REVERE COPPER AND BRASS INCORPORATED**

EXECUTIVE OFFICES: 230 PARK AVENUE, NEW YORK



# THE RUBBER SHORTAGE IS MORE CRITICAL THAN YOU THINK

*Numerous industrial rubber products now irreplaceable—except on highest priority. Crisis leads many industries to adopt G.T.M. Conservation Plan for extending life of present equipment*

**D**URING the past few weeks thousands of plant engineers, production and maintenance experts from America's leading industries have enthusiastically approved a conservation program, to relieve the acute rubber shortage, presented at a series of nation-wide meetings held by the G.T.M. — Goodyear Technical Man.

To these key operating men the importance and necessity of an immediate, all out, rubber-conservation drive was emphasized by facts like these —

Many mechanical rubber items of wide use are no longer being made by any manufacturer.

Even goods sold on priority must now be built to wartime specifications that limit rubber content to less than standard prewar construction.

So critical is the shortage, reclaimed rubber is now on allocation. Practically all synthetic rubber is being used in military equipment.

Most serious of all, several million dollars worth of industrial rubber goods now in use will fail PREMATURELY this year



*COMPLETE MANUAL ON THE PROPER USE AND MAINTENANCE OF INDUSTRIAL RUBBER PRODUCTS—furnished free to instructors and senior engineering students. Write Industrial Conservation Department D-15, Goodyear, Akron, Ohio.*

through improper operation and care, judging by past experience. This will deprive plant operators of from 25% to 50% of the full performance built into these products — an irreplaceable loss to the nation.

## **THE G.T.M. INDUSTRIAL RUBBER CONSERVATION PLAN**

The G.T.M. offers a complete, workable conservation program, based on long experience, for eliminating this unnecessary waste and insuring optimum performance from all industrial rubber products.

In factories large and small, operating men are now being taught how to prevent abuses, how to cor-

rect improper applications, how to make minor repairs that will prolong the life of industrial rubber products by means of—

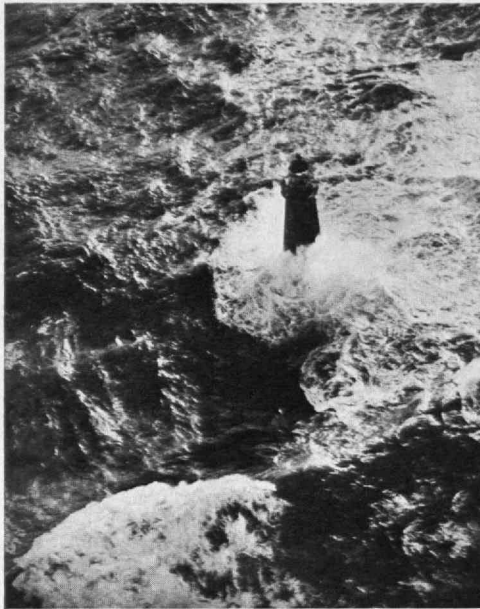
“Goodyear Wages War On Waste”—the graphic educational slide film which presents, easily and clearly, recommended conservation practices.

Practical demonstrations on how to inspect, what to look for and what measures to take to correct, how to salvage hose and belts and give them new and additional use.

“Goodyear Industrial Rubber Products Conservation” manual, the concise 40-page, profusely illustrated G.T.M. handbook with practical ideas and suggestions.

*Industry-wide adoption of this program would mean a minimum saving of many million pounds of rubber products this year — products that many plants will not be able to replace.*





Edward Rowe Snow

Stability amid the storm — Minot's Light off Cohasset, Mass., with waves dashing 85 feet up its tower

VOLUME 44

NUMBER 9

# THE TECHNOLOGY REVIEW

TITLE REGISTERED U. S. PATENT OFFICE

EDITED

AT THE MASSACHUSETTS INSTITUTE OF TECHNOLOGY

## CONTENTS for JULY, 1942

GLADIOLUS	FRONTISPIECE	436
THE SUBMARINE AT WAR	BY HENRY E. ROSSELL	438
RUBBER — TODAY AND TOMORROW <i>The Caoutchouc History of the United Nations</i>	BY GEORGE W. GRAY	441
THE POSTGRADUATE AND HIS WORLD <i>Special Need for His Skill Is Imposed by War</i>	BY KARL T. COMPTON	444
JOHN DOE, SABOTEUR <i>Carelessness, Laxity, Ignorance Upset War Efforts</i>	BY EDWARD R. SCHWARZ	447
LUCRATIVE LIGNIN <i>How By-Products of Sulphite Pulp are Put to Use</i>	BY ALLEN ABRAMS	449
WHO IS THE RESEARCH MAN? <i>Dependable Answers to This Question Are Essential</i>	BY JOHN MILLS	451

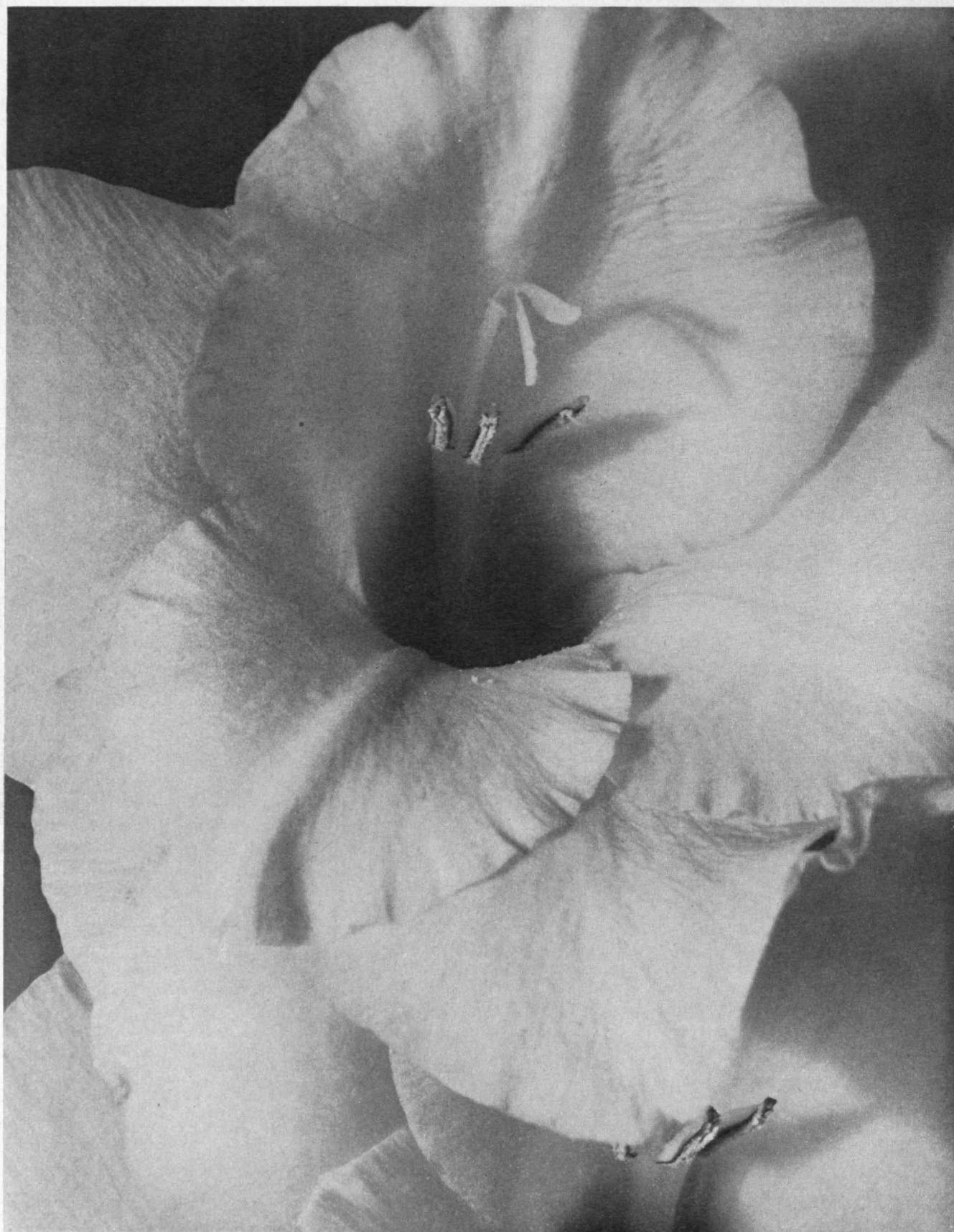
☆ ☆ ☆

THE TABULAR VIEW <i>Contributors and Contributions</i>	430
MAIL RETURNS <i>Letters from Review Readers</i>	432
THE TREND OF AFFAIRS <i>News of Science and Engineering</i>	437
THE INSTITUTE GAZETTE <i>Relating to the Massachusetts Institute of Technology</i>	453

Published monthly from November to July inclusive on the twenty-seventh of the month preceding the date of issue, at 50 cents a copy. Annual subscription, \$3.50; Canadian and foreign subscription, \$4.00. Published for the Alumni Association of the M.I.T.: B. Edwin Hutchinson, President; John E. Burchard, Harold Bugbee, Vice-Presidents; Charles E. Locke, Secretary; Ralph T. Joep, Treasurer. Published at the Rumford Press, 10 Ferry Street, Concord, N. H. Editorial Office, Room 3-219, Massachusetts Institute of Technology, Cambridge, Mass. Entered as second-class mail matter at the post office at Concord, N. H. Copyright, 1942, by the Alumni Association of the Massachusetts Institute of Technology. Three weeks must be allowed to effect changes of address, for which both old and new addresses should be given.

Publisher · H. E. LOBDELL	Editor · F. G. FASSETT, JR.	Business Manager · R. T. JOPE
J. E. BURCHARD	Editorial Associates PAUL COHEN P. M. MORSE	T. L. DAVIS J. J. ROWLANDS J. R. KILLIAN, JR.
Staff {	Editorial: JANE McMASTERS, SYLVIA THOMAS Business: MADELINE McCORMICK, RUTH KING	





Richard W. St. Clair, '36

## GLADIOLUS

*Texture and tones of summer*

# THE TECHNOLOGY REVIEW

Vol. 44, No. 9



July, 1942

## The Trend of Affairs

### *Fusion and Forecast*

**T**IMES of stress are profitable in that they lead often to revaluations and reorientations of practices and institutions which in ordinary days are taken for granted. Plans for the peacetime reconstruction of a war-torn world are now and again denounced as premature because they posit a stability yet to be realized. They may truly prove of unusual value, however, just because they are thought out in the midst of comparative chaos, when minds may well be keyed to a higher pitch and may, therefore, sense latent relationships among diverse matters. During the past year, *The Review* has several times reported on such thinking. Now to hand comes the basis of a specific program for action in an important industry, of interest for its provisioning of the future and more for its appraisal of possible new socioeconomic relations in a major national activity.

The building industry, rated as second only to agriculture in size and scope, and looked to by many a social theorist as a principal factor in facilitating the anticipated change-over from war to peace, is the activity in question. Last month the basis for a program was laid in a report prepared for the annual meeting of the American Institute of Architects in Detroit by the institute's committee on postwar reconstruction. Stressing differences between the present wartime situation and that of 1914-1918, the committee called for a merging of activities by the many groups which are interested in the problem of postwar reconstruction and which thus far have been operating more or less independently. Correlation is regarded as essential to constructiveness. Specifically, the architects advocated an organization of the groups constituting the three sections of which they consider the building industry to be composed. Architects, engineers, regional planners, producers,

builders, and labor make up the first of these divisions — the creative group, in the words of the committee's report. The finance group includes banking institutions of all kinds, insurance companies, and private investors. The third essential is the ownership group, comprising all types of private owners, buying and selling organizations, and government agencies subsidizing construction.

Such a listing in itself invokes a breakdown of compartmentalization and, in the first division particularly, a fusion of knowledge powerful in their promise of accomplishment when brought to reality. The report went beyond this, however, in arguing specifically that the three sections should collaborate, not as a planning group but as an organized public opinion, "co-ordinating sound ideas into a practical long range program, encouraging the formation of state and regional planning boards properly financed and equipped with well-trained personnel. This must be a group interested in extending private industry to the maximum, and supporting government subsidy where necessary to abolish living conditions which are a menace to our form of government."

The interest of such an organized public opinion, the architects asserted, should be focused on problems common to all sections of the nation and on Federal legislation dealing with national problems. But through the group every community should be organized on the same general plan. Local organization should be molded by local needs, and the responsibility for action should be the duty of the local groups. "The guiding principle of this work," the committee declared, "should be research, based on the scientific approach which seeks to find the facts. . . ."

Listing a dozen factors which must be reckoned with in efforts at a better social and economic system after the war, the committee elaborated on several especially within the range of architectural preoccupation. Smaller



and lighter automobiles and small airplanes, for example, are seen as possibly tending to stabilize population in urban centers. Rapid development of private flying after the close of the war must be considered in the replanning of cities, for intown landing fields will be essential. For the creation of more effective planning, jurisdiction over entire metropolitan and surrounding areas must be granted planning authorities. The self-sustaining neighborhood may result from the elimination of horse-and-buggy streets through the development of cross-town and center-to-periphery highways. In these related topics, the committee's report suggested the shape of things to come.

## *The Submarine at War*

BY HENRY E. ROSSELL

**I**N a way which is scientific and at the same time understandable to the lay reader, A. M. Low discusses the history, the present status, and the future of submarines

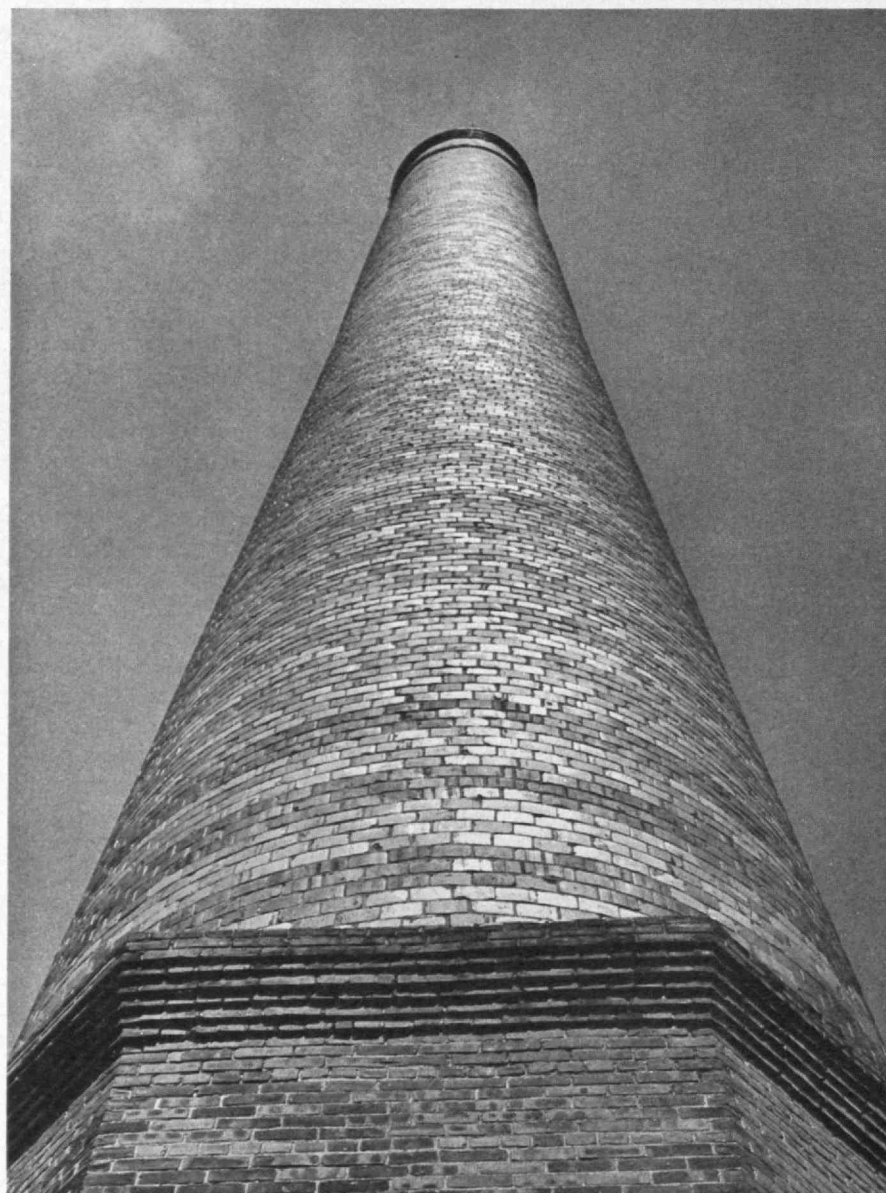
in his new book, *The Submarine at War*.<sup>\*</sup> He points out that the history of submarine navigation covers a period of several hundred years but that the early experimenters in this work faced an insoluble problem. As Low expresses it, "Inventors had the ideas but lacked the materials and means to carry them out."

For instance, David Bushnell in this country, whose one-man submarine, the *Turtle*, was the first undersea craft to be used in warfare, had to rely on hand power for propulsion and was unable to give his ship either an adequate weapon of offense or a means of vision when it was submerged. Nevertheless, this tiny vessel, built and operated in the American Revolutionary War, used the same methods to submerge and return to the surface which are found on submarines of today. Propulsion was by means of a hand-operated screw propeller, and the means of attack upon an enemy consisted of a charge of gunpowder which was supposed to be attached to the side or bottom of an enemy ship and then exploded by a time fuse. The operator of the *Turtle* had

many duties, including propulsion horizontally and vertically through two screw propellers, flooding and pumping out ballast tanks, steering, and screwing the attachment of the powder charge into the hull of an enemy ship. Calmness and versatility must have been essential attributes of the one-man crew.

Until the early years of the present century, handicaps similar to those encountered by Bushnell confronted in greater or lesser degree the pioneer workers in submarine navigation. By that time, vision was possible from beneath the surface of the sea; an effective long-range weapon, the Whitehead torpedo, was available; and adequate means were at hand for propulsion both on and beneath the surface. Thereafter, the development of submarines was extremely rapid in all navies. For instance, the German navy had not launched its first submarine until 1906, and yet in the World War of 1914-1918 it built submarines which were almost as efficient as those of the present.

Professor Low deals comprehensively with the exploits of submarines in World War I and in less detail with their performances in the current war. Perhaps few persons realize the extent of the services rendered by British submarines in the first World War. These had to do largely with scouting, and in this service radio communication proved of the greatest importance. By virtue of radio reports, mostly



*A paper-mill chimney in Massachusetts*

Myron Stephens

<sup>\*</sup>New York: Sheridan House, 1942. 305 pages. \$3.00.

from submarines operating near the German coast, the British fleet, based at Scapa Flow, was enabled to maintain a distant blockade without undue risk to major fleet units. More spectacular duties were performed by British submarines both in the Sea of Marmara and in the Baltic Sea.

On the other hand, the German submarine fleet was engaged primarily in attacks on commerce, which were military activities only in the sense that they were intended to establish a partially effective blockade of the British Isles.

All of these things and many others are discussed by Professor Low, who seems to have captured to a remarkable degree the spirit of the submarine service. His treatment is clear, comprehensive, and imaginative. Those who would understand the submarine and its present and future possibilities could make no better start than to read Professor Low's book.

### *Fertilizers and the Future*

**F**OOD may win the war and write the peace, but Europe's 1942 crops are off to a bad start. After a severe winter and a late spring, the growing season has begun under the additional handicaps of shortages in draft animals, tractor fuel, labor, and fertilizers. On the densely populated lands of Japan and western Europe, the last item is an attrition factor whose importance is apt to be overlooked by the land-rich populations of the United Nations. Neither in Australia, Canada, the United States, nor Russia do farmers worry about squeezing the last bushel of productivity from their acres as they must on soils which have been farmed hard for centuries and which are either just adequate or quite inadequate to give their populations self-sufficiency in

food. The introduction of so-called artificial fertilizers during the first part of the Nineteenth Century to increase the yield and vigor of crops was one of the larger factors by which the Malthusian wolves have been kept from many an industrialized state.

Though the consumption of artificial fertilizers in the United States is large in absolute figures — a record 9,000,000 tons in 1941 — the material is used only on one-sixth of our crop acreage and then mainly on more or less special crops like potatoes, cotton, tobacco, and garden truck. On the average, unit consumption does not even approach the peacetime figures for Japan, the Netherlands, and Belgium (the largest per acre users in the world) or those for Germany, Spain, France, Great Britain, and Italy. Of the 2,700,000 tons of nitrogen applied to the world's farms in chemical plant foods during the 1936-1937 season, Europe took about 1,500,000 tons; Asia, about 500,000; and the Americas, another 500,000. Today the amount of fertilizers being used by the Axis powers and their temporary possessions is still high but in some cases dangerously less than normal. The United States, rich in power, labor, plant facilities, and every required raw material, will not get all it wants this year. The harder pressed economies of Europe and Japan will fall still farther from their goals.

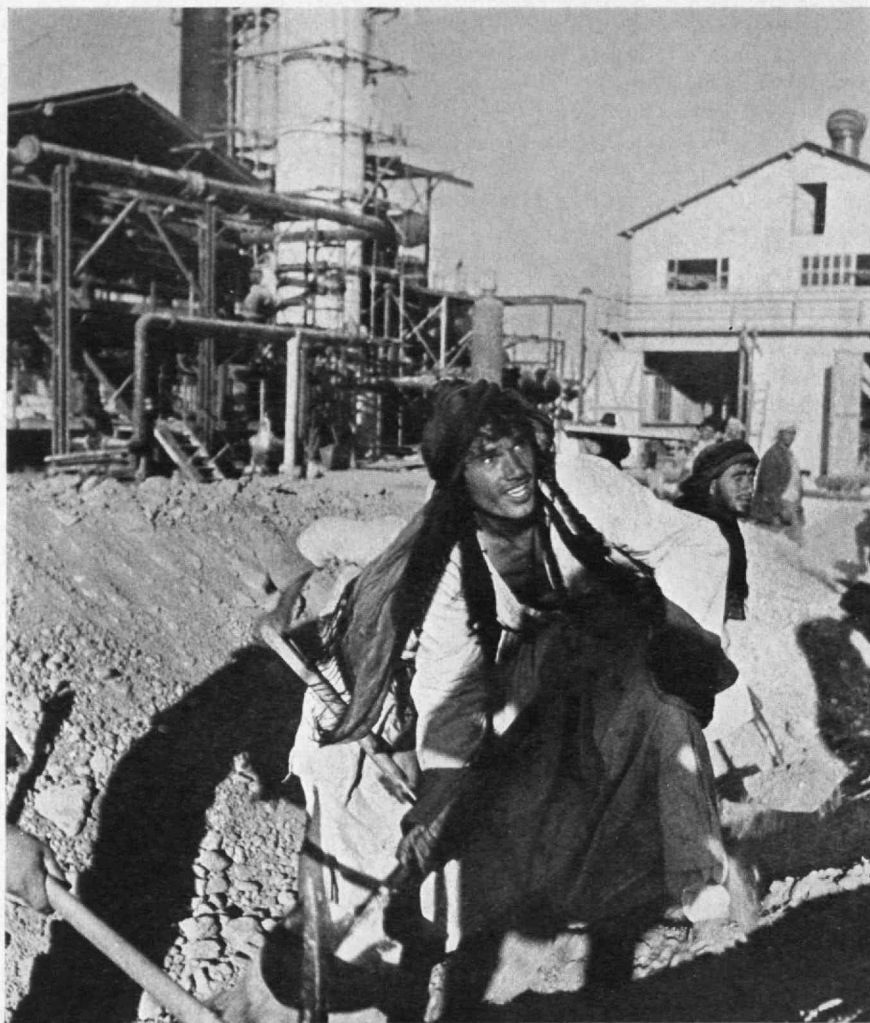
Although the term covers many important items of organic origin, such as packing wastes and fish meal, artificial fertilizers are generally thought of as products of the heavy chemical industries; in this country the more important ones comprise the superphosphates, ammonium sulphate, sodium nitrate, cyanamide, and various potassium salts. By far the most important elements added to the soil through the use of them are phosphorus, nitrogen, and potassium. The superphosphates, obtained through treatment of ground



*A feed barn on a 4,900-acre farm in Texas*

*F.S.A. Photo by Lee*





René W. P. Leonhardt

*Man working — neither Fairbanks nor Flynn on location in Hollywood, but an Arab shoveler in Iraq, where the demands of the age have put modern technology and nomad culture in strange mixture as oil fields are opened and pipe lines are built*

phosphate rock with sulphuric acid, can stimulate virtually any soil in this country except those of the blue-grass regions of Tennessee and Kentucky, which were formed from phosphate-bearing rock. Sodium nitrate from Chile was the first artificial aid furnished the farmer in his struggle to keep the nitrogen content of his topsoil at an adequate level, but today nitrates from Chile provide considerably less than 10 per cent of the supply. Synthetically fixed nitrogen, made available in enormous amounts as a result of World War I's demand for explosives, furnishes the remainder. It is true that some 150,000 tons of free and therefore unavailable nitrogen float above each acre of the earth's surface, but plants can make use of this supply only as lightning combines small amounts with oxygen or as it is fixed by soil bacteria. The latter source supplies considerably more nitrogen to the soil than do fertilizers of all types.

Potassium fertilizers, in which the United States only recently became self-sufficient, are most apt to be required by sandy soils. More than one-half of our domestic consumption is by the southern states. Before the first World War, we depended, as did the rest of the world, on the mines in Germany proper and in Alsace-Lorraine. In 1915, our total output was equivalent to

only 1,090 tons of potassium oxide; by 1938, United States production amounted to 317,000 tons of potassium oxide; and the last year, over 510,000 tons were produced.

Demand for artificial fertilizers in this country during 1942 is expected to exceed 1941 consumption by 10 to 15 per cent, but if production will keep pace is doubtful. Plenty of phosphate rock is available, but sulphuric acid supplies may prove a bottleneck. Military needs for elemental phosphorus will interfere with the production of certain types of phosphate fertilizers. Fertilizers containing nitrogen will probably fight a losing battle for plant capacity and electricity against explosives containing nitrogen. Potassium fertilizers will share with other fertilizers the problems of finding burlap bags and transportation. In this country fertilizers are commonly made in relatively small plants which distribute a large part of their output by truck. Demand, if such a positive feeling still finds expression among the farmers of the totalitarian states, is unquestionably very high in Europe. Cut off from normal imports of food, with stocks depleted by several years of pillage, poor weather, and bad harvests, and with large parts of the agricultural system disrupted by war and invasion, Europe in its dependence on artificial fertilizers nears critical conditions. Sweden is impartially cut off both from imports of grain and

Chilean nitrates, while fertilizer imports from Germany must struggle with savagely overloaded transport means and with Germany's own pressing requirements. The fields of Spain have been receiving inadequate amounts of fertilizers since her civil war. France has lost the potash mines of Alsace-Lorraine. Germany may be meeting her own potash requirements, but even her enormous nitrogen-fixing capacity appears unable to supply both farmers and soldiers. The superphosphates are her most serious deficiency, for the country is lacking in phosphate rock. It is interesting that, in spite of the fact that the surface of the Mediterranean is not an altogether safe place for freighters, Tunisia exported 502,130 metric tons of phosphate rock to Italy and Germany in 1941, according to the United States Department of Commerce. Shortages in the production of chemical fertilizers are reported from Japan. One more letter is being added to the handwriting on the wall.

### *The Reason Is Resin*

SYNTHETIC rubber, plastics, and wood may seem to have little in common, yet the first two have contributed to the last at a (Continued on page 469)

# Rubber—Today and Tomorrow

## *From Plenty to Poverty in One Year Is the Caoutchouc History of the United Nations; Programs to Meet the Problem Bar Return to the Pre-War Status*

BY GEORGE W. GRAY

THE combat on wheels, wings, and hulls which is modern war requires, above all, two commodities — petroleum and rubber. If the Axis is a have-not in petroleum, the United Nations now find themselves critically impoverished of rubber. A year ago we were bursting with caoutchouc riches. Our British and Dutch cousins were in virtually complete control of the vast plantations of British Malaya, Sumatra, Java, Borneo, Burma, Ceylon, and India — lands which produce well over 1,000,000 tons annually, more than 95 per cent of the world's supply; and our tankers and other ships, laden with latex and rubber, plied the Pacific in undisputed transport out of Singapore and other rubber ports of the East.

Then came *der Tag*. When the Japanese dive-bombed Pearl Harbor, 140,000 tons of crude rubber were en route to the United States from the plantations of the Orient. Some of the ships were so close to the danger zone that they found it expedient to take refuge in friendly harbors, but, according to report, practically all of the 140,000 tons eventually reached destination to augment the 600,000 tons already in storage here.

The total thus provided would be more than enough to care for all United States rubber needs into 1943 under normal peacetime conditions. But an army marches, rolls, flies, floats, fights, and sometimes even breathes with the indispensable aid of rubber. Moreover, in addition to its own necessities, the Arsenal of Democracy is committed to supply the military requirements of all the United Nations. Even allowing for only basic needs (such as those of medicine and surgery, fire protection, electrical insulation, indispensable transportation, and other demands which cannot be adjourned even for Mars), it is estimated that the United States will have to process from 800,000 to 1,000,000 tons of rubber annually if the vast program of global war is to be pushed unreservedly on land, in the air, and on the sea. Indeed, total consumption in the United States is estimated to have reached 725,000 tons during 1941, according to *Rubber Age*. But this amount included, in addition to the military requirement, unrestricted manufactures for civilian use, which attained a new high during the first six months of that year. One must bear in mind, too, that last year's consumption antedated the rapid expansion of the arms program which followed the Axis attack on the United States in December.

Guns, airplanes, and tanks — pre-eminently things of metal — are also things of rubber. The carriage of a 37-millimeter antiaircraft gun includes 190 pounds of

rubber. To provide the bulletproof gasoline tank for a Flying Fortress requires 1,246 pounds, while each tire takes 96 pounds and each inner tube 55. For pursuit planes and other lighter craft, the requirements are less, but on the average every airplane eats up half a ton of rubber — and the schedule calls for 60,000 planes in 1942 and 125,000 in 1943. Tanks are lined, cushioned, and in other ways equipped with rubber to the extent of about a ton per tank — and the schedule calls for 45,000 tanks in 1942 and 75,000 in 1943. The 10-ton pontoon bridges on which troops cross streams contain more than a ton and a half of rubber each, and the 35,000-ton battleships are 75 tons rubber. Pneumatic rafts (29 pounds of rubber), gas masks (1.81 pounds), cable assemblies used by the Signal Corps (150 pounds) — the roster of military supplies in which rubber figures as an essential ingredient runs into a lengthy list, so that it is no wonder the total poundage reaches astronomical figures.

The United States entered 1942 with stocks of 693,000 tons of crude rubber, according to Leon Henderson's testimony to the Senate committee investigating national defense activities. How much we can add to this during the present year is problematical. As long as India and Ceylon hold outside the Axis, we should be able to bring in some cargoes from those countries, whose annual production in normal times is about 15,000 tons for India and 85,000 for Ceylon. In Ceylon we have our largest immediate source, and if it falls into Japanese hands our last important ties with the rubber of the East will have been severed. Then dependence on Western Hemisphere rubber and on the thin trickle from Africa will be virtually complete.

Immediate expectations from these sources are not roseate. In 1939 the total African production was 16,000 tons; the total South American, 16,000, mostly from Brazil; and an additional 3,000 came from Mexico. Since then, production from some parts of these regions has been stepped up.

In Africa, the Firestone plantations in Liberia produced 7,000 tons in 1940, and 10,000 in 1941; and the expectation is that they will increase this output for the present year and perhaps attain 15,000 tons in 1943. As for wild rubber of the Congo, which occupied so spectacular a place in rubber history 50 years ago under King Leopold II, little has been said of its potentialities for the present emergency.

Brazil, the original home of rubber, undoubtedly has enough wild *Hevea* trees to supply all requirements. But so much of this jungle rubber is inaccessible on any





H. Armstrong Roberts

Somewhere between 500,000 and 1,000,000 tons constitute America's reservoir of scrap.

basis of economic production that the effectiveness of the present price premium in accelerating the collection of wild rubber is yet to be demonstrated. This premium amounts to about 17 cents over the  $22\frac{1}{2}$  cents per pound at which prices for rubber are pegged in the United States. The fact is that so many tire factories and other rubber-working establishments have been built in Brazil within the last half-dozen years that, in 1941, Brazilian industry consumed more rubber than the forests of the Amazon produced, with the result that Brazil became an importer of Malayan crude. Prodigious efforts are being made to increase the production of rubber from its ancestral home. A New York Times dispatch quotes the director of the Agricultural Institute of Pará as saying that 25,000 tons will be collected this year. Tappers have been recruited, programs of vaccination against yellow fever, typhoid, and other tropical diseases have been instituted, recruits have been instructed in the use of new machines for processing rubber, and 1,000 of these machines have been provided. The United States Government, through a highly organized wild-rubber procurement program, is co-operating with South American governments in efforts to speed immediate production.

Representatives of Haiti recently announced that if prices were high enough, their small country could immediately supply 5,000 tons a year — the implication being that for a big cash bonus the rubber trees would be bled to excess. As it is, the Haitians, with the technical advice and co-operation of the United States Department of Agriculture, are developing rubber plantations of 100,000 acres, on which some 2,500,000

trees of the *Hevea brasiliensis* species were recently set out. It is claimed that these plantings will come into production by 1947. They constitute, next to Henry Ford's Brazilian undertaking, the largest rubber-growing project in our hemisphere.

The Ford plantations in the Amazon Valley, which have more than 3,000,000 trees under cultivation, yielded 500 tons of rubber in 1941. The estimate is that by 1950, they will be producing an annual 7,500 tons. But 1950 yields are not going to help fight the Axis in 1942 and 1943, nor will the interesting experimental plantings of Goodyear in Costa Rica.

More encouraging of immediate results is the Mexican promise from its guayule shrubs and to a lesser extent from its *Castilla* trees. Last year Mexico produced some 5,000 tons, and the 1942 production is expected to be double that amount. Our government has encouraged the planting of 75,000 acres of guayule in the arid regions of California, New Mexico, Arizona, and Texas. If this acreage is brought to seed by 1943, it should provide sufficient to plant 10 times the original acreage. On this basis, a government expert estimates, we may get from our guayule as much as 12,000 tons of rubber in 1945 and 120,000 by 1947 — but the project again is an investment for the future rather than a solution of the 1942 shortage.

So, too, is the vast program for synthetic rubber now being instituted. In contrast with what is contemplated — indeed, with what is actually projected — the synthetic rubber industry could hardly be regarded as much beyond the pilot stage of development last December when the Japs attacked. American production totaled perhaps 17,000 tons in 1941, whereas plants now being built or authorized will have a combined output of 800,000 tons annually. Never in history has an infant industry been expanded on so tremendous a scale and at so explosive a rate. This gigantic program would be an impossible undertaking for any nation but the United States, as E. G. Holt, rubber expert of the Department of Commerce, remarked in an address to American and Canadian chemists last April. Even so, he continued, it will test the resources of our industry to the utmost. It will involve the complete synchronization of new plants for the manufacture of butadiene, styrene, acrylonitrile, and other basic materials, catalysts, emulsifying agents, accelerators, and the like, which collaborate in the emulsion-polymerization processes, as well as for plasticizers and special compounding agents for the finished polymers.

Scores of man-made chemicals go under the name of "synthetic rubber," though none of them is a true synthetic in the sense that synthetic indigo, synthetic thiamine, and synthetic adrenalin are. For these three substances actually duplicate the chemical constitution of the original biological products as found in nature, whereas no one has been able to duplicate the peculiar architecture in which protoplasm fashions five carbon atoms and eight hydrogen atoms into units and then strings thousands of these  $C_5H_8$  monomers together to form the vast molecule which is caoutchouc. The molecule is the same, whether drawn from the majestic *H. brasiliensis* tree or the scrubby guayule bush or the lowly dandelion or any of the scores of botanical species

which in varying degrees produce rubber. Man has never been able to reproduce its pattern, perhaps because man has never been able to discover just how the links are joined together, though he has broken the chain into its chemical elements. Michael Faraday, in 1826, analyzed rubber into carbon 10 parts and hydrogen 16. Thirty-four years later another English scientist, C. G. Williams, lowered the formula by breaking rubber down to a water-white, mobile, low-boiling liquid which proved to be dissociated units of  $C_5H_8$ , to which he gave the name "isoprene."

For years thereafter, chemists tried to make rubber by combining units of isoprene. In 1910, when the price of crude reached \$3.00 a pound, researchers in England and Germany fairly raced for a laboratory substitute. Both groups eventually attained processes for the production of isoprene and for linking it into larger molecules. It was to one of these products, known as methyl isoprene, that the Germans resorted in 1915 when the British blockade shut them inside Europe. The Germans established a plant which turned out 150 tons monthly, but the product was inferior, and as soon as natural rubber became available the production of the synthetic lapsed. As rubber rose in price, the quest was resumed, yet as late as 1930 synthetic rubber was still a crumbly short-lived product.

In a recent lecture Howard I. Cramer, Secretary of the division of rubber chemistry of the American Chemical Society, recalled that not until they abandoned the time-honored approach of trying to duplicate the exact molecular configuration of rubber did the synthetic chemists begin to go to town with their problem. It was a new approach—whereby they sought to fabricate a substance possessing rubberlike qualities without attempting to imitate the chemical composition of rubber—which yielded the first commercially successful product, neoprene.

Neoprene grew out of the fundamental research of an organic chemist, Julius A. Nieuwland of the University of Notre Dame, who was not trying to imitate rubber at all but was merely following his scientific curiosity in experiments with acetylene. Something in one of his reports to the American Chemical Society caught the attention of Elmer K. Bolton of the Du Pont laboratories, who was trying to produce rubber. He recognized that here was a clue to a compound that might be rubberlike. He consulted Nieuwland, made arrangements for collaboration, and then assigned a crew of Du Pont chemists to the practical problem. Neoprene is built of units containing four carbon atoms, five hydrogen atoms, and one atom of a substance which is foreign to rubber, i.e., chlorine. The new compound was first announced in 1931, and 250 pounds were produced in 1932. Last year 6,500 tons were manufactured; by the beginning of 1942, capacity had been raised to 9,000 tons, with 19,000-ton production in sight for 1943.

Thiokol was produced in 1930, and its molecule contains such alien atoms as oxygen and sulphur. Koroseal, another chlorine compound, was announced in 1933. And in 1935 came news from Germany of the attainment of the Buna rubbers, whose basic raw material is butadiene, compounded of units containing four atoms of carbon and six of hydrogen.



*Brunk from Black Star*

*No, these are for army motorcycles. Similar orderliness must be brought out of chaos for other purposes.*

In the United States, Buna or Bunalike products have been made in a small way by the Standard Oil Company of New Jersey, United States Rubber Company, Firestone Tire and Rubber Company, B. F. Goodrich Company, and Goodyear Tire and Rubber Company. Koroseal is produced by Goodrich, who have expanded their plant at Niagara Falls and recently completed a new plant at Louisville, quadrupling production. Koroseal is classed by chemists as a polyvinyl chloride derivative. In this same chemical grouping are Vinylite, produced by the Carbide and Carbon Chemicals Corporation, and Flamenol, by the General Electric Company. Thiokol is manufactured for the Thiokol Corporation by the Dow Chemical Company, and neoprene remains a Du Pont product.

According to a tabulation prepared by Dr. Cramer, America's present and immediately prospective annual capacity for producing synthetic rubber is indicated by the following figures, representing long tons:

	January, 1942	January, 1943
Buna types.....	10,750	70,000
Neoprene.....	9,000	19,000
Thiokol.....	1,750	2,650
Polyvinyl chlorides (40 per cent plasticizer).....	6,000	18,000
Total.....	27,500	109,650
Percentage of normal requirements.....	4.6	18.2

Of the government's program for 800,000 tons of synthetic, 700,000 will be of the Buna S type, according to the information which was (*Concluded on page 458*)



# The Postgraduate and His World

*Loyalty to the Professional Field Opened by Advanced Study  
Distinguishes Him; Special Need for His Skill  
Is Imposed by War*

BY KARL T. COMPTON

POSTGRADUATE COMMENCEMENT ADDRESS

YOU who are receiving degrees tonight at the Institute's first postgraduate commencement are joining a relatively new but rapidly increasing group of educated men. Practically speaking, postgraduate education in the United States dates back only about two or three generations. Prior to that time, most of the small group who pursued formal studies beyond the undergraduate college did so by going to Germany or, to a less extent, to France or England. The early influence of Johns Hopkins University is generally credited with having stimulated the development of advanced education in this country. Since 1876, when Johns Hopkins University was founded, postgraduate study in the United States has increased at a continually accelerated rate, beginning first with the sciences, the classics, philosophy, and the professional schools of medicine and law.

Postgraduate training in engineering is relatively new in comparison with the fields just mentioned. Our own institution has been the leader in it. A curve of registration in the Graduate School at M.I.T. would start from almost zero beginning in 1920, just after the end of the last war. From then until we adopted the principle of stabilization of enrollment a few years ago, registration of graduate students grew almost uniformly and at about four times the rate of increase for undergraduates. The same trend is repeated in the other engineering and technological schools of the country.

This growing emphasis on postgraduate education in science and the engineering arts is simply a reflection of the increasing body of knowledge and art in these subjects. No longer can a person secure in four years the fundamental background and enough specialized training in any one professional field to give him real competence. We believe that our undergraduates, when they receive their bachelor's degrees, are well prepared to begin their professional study and training, but they are not yet specialists. One of the most important aspects of postgraduate training is the intensive discipline in how to become a specialist. But you who have just received advanced degrees still have much to learn. For although you have acquired some tools of knowledge and skill which are of a specialized nature and which rely upon a fundamental background of general and scientific education, nevertheless it is absolutely certain that to remain effective specialists you will have to continue throughout life the art of mastering new additions to knowledge and new improvements in art, since technology is developing with ever increasing rapidity.

One of the great problems of education is how to provide specialized training and at the same time maintain that breadth of knowledge and sympathy which is necessary both for effective co-ordination of the various specialties into an integrated effort and for assuring the individual sufficient interests in fields outside his own specialty to enable him to lead a well-rounded intellectual life. One effort toward the solution of this problem is centered in the curriculum, in which our postgraduate training is built upon the foundations of basic science, together with an amount of attention to the social sciences and the humanities which is rather unusual in technological school programs. Any real solution of the problem, however, has to go much deeper than the technological school curriculum. It goes back into the secondary school and the home and is one of the elements taken into consideration in the admission of our students under the plan of stabilized enrollment.

Still another approach to the solution of the problem is centered in the social life of our graduate students. The opportunity for this approach was first strongly emphasized by Andrew Fleming West, former dean of the graduate school of Princeton University, and was the basis for one of the several points of vigorous disagreement between him and Woodrow Wilson in the administration of the affairs of that institution. Both of these eminent educators were strongly imbued with the ideals of democracy and breadth of vision in administering the educational program at the university level. President Wilson believed that this aim could best be achieved by a house plan whereby the graduate students would be scattered among the undergraduates so that all degrees of intellectual maturity and all types of interest, whether scholastic, social, or athletic, would be grouped together.

Dean West, on the contrary, held to a more realistic view. He pointed out that in intellectual maturity and interest graduate students had reached a level beyond that of the average undergraduate, so that when graduate students lived among undergraduates the two very seldom mixed in their interests and activities. He maintained that President Wilson's scheme would simply irritate the undergraduates and isolate the graduate students with the result that the latter would be even more narrowly restricted in their social life than they would have been had no scheme at all been attempted. Dean West's solution to the problem provided for a graduate students' house in which these men, who specialized in a wide variety of departments and research

problems, would be given the greatest opportunity to become intimately acquainted with each other under conditions that would encourage the student specializing, for example, in archaeology to talk things over with his new-found friend specializing, for example, in biological chemistry. Thus each in his hours of leisure or at mealtimes would naturally broaden his sympathies and his knowledge by learning something of the problems and the methods of approach in the other field.

The argument between President Wilson and Dean West proceeded vigorously, even to the point of splitting the Princeton faculty into two factions; it was finally settled in favor of Dean West through his success in raising funds to build the graduate college as a home for Princeton graduate students. I was so impressed by the success of this program in enriching the intellectual interests of the Princeton graduate students that I was ambitious for a similar arrangement at Technology. This desire happily became a reality through the pressure for additional dormitory accommodations and the opportunity — discovered by our Treasurer, Horace Ford — to acquire the erstwhile Riverbank Court Hotel for conversion into our present Graduate House. Most of you have lived in that house and are in a better position than I to judge of its benefits. Yet in so far as I have been able to evaluate the situation, I believe there is evidence that here, as at Princeton, this aspect of our graduate program has not only added to the pleasure of our graduate students in residence but has also been effective in stimulating breadth of intellectual interest at the time when each student is concentrating his academic efforts to master and advance the knowledge in his chosen specialty.

The difference in attitude between undergraduate and postgraduate students is especially pertinent for discussion at this occasion. The difference is partly one of degree of intellectual maturity. Characteristically, the undergraduate develops a strong loyalty to his institution, a loyalty which is carried throughout life and is shown in the enthusiasm of class reunions and alumni gatherings. For some, this loyalty and enthusiasm are chiefly centered around athletic activities; for others, around fraternity or other social relationships. The feeling toward the class, however, is always strong. These things emphasize the fact that the period of undergraduate life is one in which the student is developing as a social being — making his social and intellectual con-



Paul J. Woolf

Entrance lobby of the George Eastman Research Laboratories at Technology

tacts, finding his working relationships with his fellows as well as with various groups and organizations. It is generally the period at which he has first been graduated from the more intensive controls and relationships of the home and has started out to make his place in the larger society of educated men and men of affairs. To be sure, the undergraduate period is also one of intellectual development and acquirement of knowledge and skills, yet these are only a continuation and refinement of the educational process to which he has been exposed since childhood. We know that many — and we hope that most — of the students who receive our bachelor's degrees have acquired an abiding interest in the subject in which they did their major study, have developed some intellectual powers, and have stored away considerable useful knowledge. But subsequent experience shows that the strong emotional effect of an undergraduate college experience is usually a loyalty to the institution and to the group of fellows in the class, the team, the fraternity, or the other activities by which the student has developed as a young man among men.



In general, the graduate student is most profoundly impressed by a different aspect of his postgraduate school contacts. He also may develop a certain loyalty and affection for the institution and for the professors under whom he has worked. He may feel proud of the fact that he is a graduate of that institution and be grateful for the opportunities which it has afforded him. But in greater degree, his abiding emotional reaction is of interest in, and loyalty to, the professional field which his graduate study has opened to him. At that period he becomes professionally, in his own mind and in the mind of his colleagues, a chemical engineer, a physicist, an aeronautical engineer, or an architect. True, he has not yet reached a full professional grade, because he still lacks the required experience and the opportunity to prove that he will be an effective member of the profession. Nevertheless, he has acquired the professional attitude, and the center of gravity of his interest has shifted from the activities of a group to personal preparation for a field of specialized knowledge or skill and the contributions he can make thereto.

I trust that you who are receiving degrees at this exercise will go away with a kindly feeling toward Technology as an institution and toward its Faculty and your fellow students as individuals. But I feel sure that for most of you the primary significance of this occasion is that you have finished successfully the first stage of your professional career and that you are now about to enter the next and much longer stage, in which you will apply your professional attainments to the art of earning a living and of performing a useful function in society.

Many signs indicate that we are entering a period in which increasing attention will be given by society to the selection and training of men to perform or to coordinate the specialized tasks which our complex civilization demands. This has become a war issue of great importance in the application of our present Selective Service System and in the organization of the War Manpower Commission, which is now proceeding under the direction of Paul V. McNutt. I have no doubt that this emphasis on the selection of personnel and on the assignment of them to tasks for which they are best fitted, which has been forced by the emergency conditions of war, will be reflected and to some extent continued in our postwar society more aggressively than heretofore.

You who are being graduated tonight have gone through several phases of this selection. In the first place, you have given evidence of aptitude for the subject in which your degrees have been awarded; otherwise you would not have come through the academic sifting process. In the second place, you are working in a field which you have selected, and this selection by you is evidence of two essential attributes for success: interest in your field and some degree of success in it. As you go to face the job of putting your professional training to use and developing your abilities still further, this selective process will continue to operate through the natural laws of survival of the fittest — and I use the term “fittest” to include not only natural ability, aptitude, and previous training but also such additional qualities as enthusiasm, perseverance, reliability, loyalty, adaptability, and effective sustained inner urge to

master continually the new problems which confront you and the new developments which arise in the field of your work.

LET me now suggest a few of the elements in our national situation which will influence opportunities for professional careers. Such a discussion naturally falls into two parts: first, the professional man in wartime and, second, the professional man in the postwar era.

Very little need be said about the professional man in wartime, since this is the subject to which the national administration, all active war agencies, and all professional groups have devoted intensive thought and discussion. From the beginning of the war-preparedness program, the national administration has adhered to the ideal of utilizing man power in such a way that every man will be used where his contributions to the success of the war effort will be most effective. As is natural in such a gigantic effort, mistakes have been made in both general policy and the administration of policies in particular cases. I think it fair to say, nevertheless, that the policies on the whole have been wise and well executed and that the administration has been alert in its effort to correct mistakes.

As the war effort continues, the fact becomes increasingly clear that varying degrees of urgency and priority for man power hold true in the different professional fields. The National Roster of Scientific and Specialized Personnel has served both as a clearing-house for information regarding the availability of persons of various skills and as a means for continual evaluation of supply and demand. At the present time this agency, in collaboration with the Selective Service System, the United States Office of Education, and the War Manpower Commission, is beginning a more intensive survey of certain professional fields which are termed “strategic,” in the sense that the requirements for men in them exceed the visible supply. I am told that 10 fields in the technological professions have been classified as strategic, and I know, from participation, that the survey of one of them has already been made.

This survey sets up the anticipated requirements in the field at quarter-year intervals for the next two years. Against these numbers it lists the supply under three groups: First, it classifies the existing personnel of the profession — the survey for this field showed less than a dozen men in the entire United States who are not superannuated, invalided, or aliens not now actively employed. Second, it lists the number of persons who will enter the profession through graduation with master's or doctor's degrees during the successive quarterly intervals of the next two years. Third, it estimates the number available with basic training and education in related less strategic fields who might be converted into the professional grade in this particular field through intensive training programs, and it estimates the number of teachers who would be required to conduct such a training program. For the field with which I have been concerned, a rather staggering number of teachers is needed, a source of whom under existing conditions is so difficult to find that a special training program for teachers in this field is being put into operation this summer. Even (*Continued on page 462*)

# John Doe, Saboteur

## *Carelessness, Laxity, Ignorance Conspire to Upset War Efforts by Destruction and Delay; Vigilance the Way to Victory*

BY EDWARD R. SCHWARZ

**W**ILD-EYED WILLIE, with tales of terror, flaming torch, and lethal bomb, personifies the wicked saboteur—or so the public thinks. What John Doe fails to realize is that he himself may more likely play the part, for honest and patriotic citizens have effectively sabotaged our war effort. We ourselves have blown up and burned millions of dollars' worth of food supplies, lumber, cork, rubber, gasoline, and airplane parts within the past 12 months.

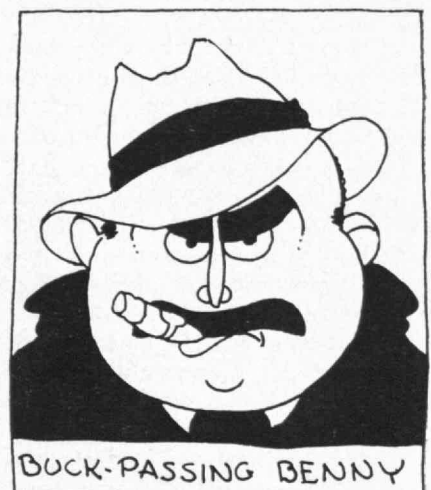
True, the professional saboteur is in our midst, but freezing of enemy funds and isolation of enemy embassy officials in this war as in the last have made his operations less easy and his menace less acute. Before such steps were taken in 1918, this country had nearly 100 instances of serious sabotage. Following the action, major instances of sabotage virtually ceased. We learned a lesson from the experiences of the last conflict, and thus far we have been fortunate in this. Our tremendous increase in war-material production is an invitation to sabotage, nonetheless, and calls for the constant and thorough exercise of every protective measure and every precaution which we can devise.

Essentially, sabotage is the intentional interference with our war effort and involves the action of persons to produce immediate or eventual destruction of property or damage thereto. The Federal statutes define war materials, war premises, and war utilities broadly and leave almost nothing not subject to the sabotage law. It is to be noted that sabotage is dual in nature: It involves men and materials—persons and property—the saboteur and the substance or the service to be

sabotaged. Thus sabotage could be prevented by the wiping out of the saboteur. This accomplishment unfortunately is not completely possible.

Although the time has long since passed when any inhabitant of this country could legitimately object to having his fingerprints on record, fingerprints serve really only as one means of identification, however efficiently they may be taken, indexed, and filed. They make possible a checkup of past records and are available for future reference, but only after the fact of the crime. They are not efficient as a means of determining the identity of an employee entering or leaving a plant. Many other devices must be used to this end, the necessity for which is evidenced by the shocking instances uncovered by the Federal Bureau of Investigation of how easily foreign agents can enter our plants.

Only recently, Arthur C. Carruthers, writing in *Safety Engineering*, described the experiences of an agent who was able to enter a munitions plant without any identification. Nobody challenged him, and he spent the entire day discussing methods of production, studying processes of manufacture, and questioning employees. His survey completed, he identified himself to the management and made recommendations concerning the provision to each worker of a badge bearing the individual's photograph. His suggestions were accepted and acted upon. Some weeks later he returned to the plant to find out how effective the system had proved. Wearing a badge similar to those provided by the company but bearing a photograph of a monkey, he spent three days in the plant without being challenged. Each



From a rogues' gallery by Henry B. Kane, '24



individual must assume responsibility if any system of identification is to be effective. Every care must be taken to prevent unauthorized entry or access to confidential material. Equal pains must be taken to provide adequate authorization for all who have been thoroughly investigated and cleared. Yet in one industrial plant the man in charge of blueprints, specifications, and formulas was found to have escaped from an institution for the criminally insane and to have been discharged from two previous jobs.

In peacetime, our national stupidity in the matter of fire alone destroys hundreds of millions of dollars' worth of property every year. Ignorance and carelessness play the major roles in this drama of destruction. In wartime, they effectively sabotage our war efforts by the destruction of material and the slowing down of production. As long as they operate, we will, for example, store two great quantities of combustibles in one improperly safeguarded location, with dire results: We burned 10,000 tons of cork stored in close piles in a nine-acre storage yard in Baltimore where, in the past 10 years, 38 fires had occurred. Fifteen alarms summoned 60 pieces of fire apparatus and 450 firemen, who were unable to extinguish the blaze. Last year, in Fall River, enough rubber to make 2,000,000 tires was burned because material of too much value was stored in one place without adequate firebreaks. Sprinklers were shut off too soon and reopened too late; hydrants were defective; and ancient mill buildings were used for storage of irreplaceable raw materials. The loss of manufacturing sections of the plant caused valuable production to be curtailed.

Adequate information on the nature and prevention of dust explosions is available, but in spite of this fact one-third of our national capacity to produce magnesium powder for bombs and tracer bullets was blown up in New Jersey last October. Moreover, with foodstuffs of vital importance for ourselves and for our allies, only ignorance and carelessness can account for the \$1,400,000 grain-elevator fire and explosion in Wisconsin last January. The Axis may well leave us to our own normal, destructive lack of care and save itself the cost of sabotage.

Watchmen and guards must be selected because of their brains and brawn and not because they are on the verge of retirement or are practically disabled. The \$900,000 Philadelphia lumberyard fire which, one year ago, swept 4½ acres of congested storage of defense lumber piled 30 feet high and which menaced an adjoining shipbuilding plant was caused by breakage of a kerosene lantern when the only watchman, an elderly man, died suddenly of heart failure in his shack.

Nor are passive guards enough. Precautions against indirect sabotage are essential, and this fact means constant activity and alertness by those on guard duty and by every citizen. The destructive nature of fire as a tool for the saboteur is apparent, but, as fire fighters well know, all fires are small when they start. To insure maximum destructive action, therefore, the enemy agent makes certain in advance that fire-protective devices are rendered ineffectual — that fire-alarm systems are put out of commission, that hydrants are clogged, that extinguishers are empty or equipped

with improper chemicals or with an improper type and size of nozzle, that sprinkler systems are out of action, that fire doors are damaged, and the like. Once started, the fire hence can spread rapidly and wreak widespread havoc. Constant vigilance and the knowledge of what to look for are essential to combat this indirect sabotage. Unless the inspector is competent and widely experienced, he fails to detect dangerous conditions.

A case in point was noted in New England by a Federal inspector of war industries, who visited a brand-new plant which was maintained in spotless order by an unusually complete system of good housekeeping. No smoking was permitted in the plant, and no lunches could be eaten except at designated locations well removed from rooms used for production. This particular inspector had had experience with other plants where similar rules were enforced, and so he went straight to the immaculate, smokeproof, isolated stair turrets. Here fine new fire hose was located at each floor landing. When the nozzles were removed and inverted, over a peck of cigarette butts and burned matches was shaken out. A man "sneaking a smoke" in the stair tower had no way to dispose of the matches and butts when he heard someone approaching except to stuff them into the conveniently placed fire nozzle. Further examination showed that in addition to the weakening of the hose by burned spots at the base of the nozzle, damage also occurred from bits of meat, cheese, and buttered bread hidden among the folds of hose in the rack. Not only had mildew and rotting of the fabric casing resulted, but crickets attracted by the food had injured the hose.

A plant employing large quantities of inflammable solvents provides another example of the need for careful inspection. The exhaust fumes from its ventilation system were blown out across the main fire escape. No method was provided for shutting down the circulating fan, and so, had a fire occurred, the fire escape would have become a blast furnace.

Production inspectors also have responsibilities to prevent sabotage. The approval of parts known to be defective is a favorite trick of the saboteur. Tampering with gauges and alteration of specifications and drawings are others. Fomenting of labor unrest is a method employed by the fifth columnist. The effect of rumors on the morale of the worker may be vicious. In one instance, rumors that a number of men had been killed in a matter of weeks in a large war-industry plant, and that hundreds were being crippled for life, were so effective and widespread that the hiring of new help became practically impossible. A checkup showed that the rates of accident frequency and severity were normal in the plant and that not a single fatality had occurred. The slowing down of production was serious and the efforts of Chattering Charlie had again been successful. The defense against rumormongers has been summed up in Britain by the phrase, "tight-lipped vigilance." A New England fire chief neatly put the idea into firemen's language, "Don't let your nozzle drizzle!" One is reminded of the old Yankee who explained his success in five words, "I neither borrow nor lend." He might properly be emulated now. Refuse to listen to rumors or to spread them. Another aspect of delay brings us once again to the need for direct action and (*Concluded on page 460*)

# Lucrative Lignin

## *How Chemical Research Has Aided the Paper Industry to Put to Practical Use the Once Wasted By-Product of Sulphite Pulp*

BY ALLEN ABRAMS

THE tree is a thing of beauty to the artist and a source of lyrics to the poet. Even the historian is impressed when he reflects that redwood trees of today were sprouting three thousand years ago when little David was pursuing Goliath with his sling. But to the engineer the tree is just another raw material — generously abundant and of untold use to humanity. For ages men have fashioned and shaped wood to fit their many needs, yet the tree never came into full importance until long after men had learned to communicate their thoughts by the written word. They sought a plentiful supply of fiber for papermaking and found it in the forests. Though scarcely a century has elapsed since that important event, many phases of our modern civilization would have been impossible without it.

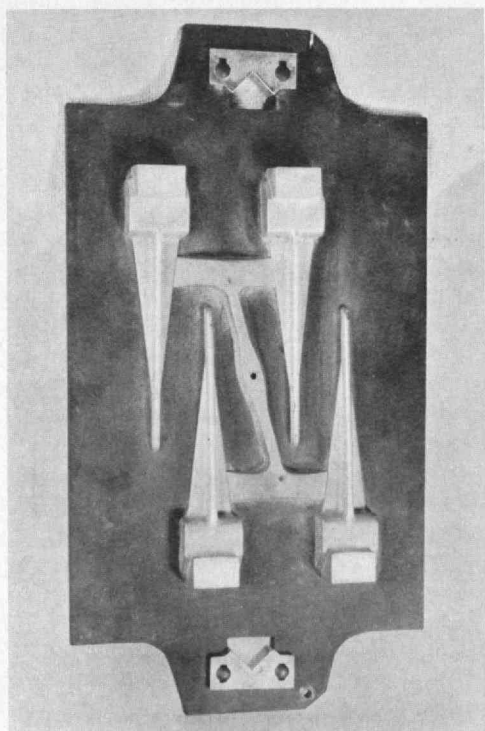
The manufacture of pulp and paper from wood has been made practicable by the ingenuity of the chemist and the engineer. Wood has a complex structure of cellulose fibers bound together with natural lignin cementing materials so strong and enduring that they will resist centuries of exposure. Yet with modern pulping methods, the cement can be broken down and the cellulose fibers can be set free within a few hours.

There are two principal chemical processes for doing the job. One involves alkali; the other, acid. The alkaline treatment has two branches, termed the soda and the sulphate processes. In both of these cooks, the non-cellulosic materials are dissolved, leaving the cellulose fiber practically unaltered. The spent cooking liquor, containing the noncellulosic material in solution, is evaporated and burned, heat being generated from the organic matter and the chemicals being reclaimed.

The acid method for the manufacture of pulp is called the sulphite process. In this procedure also the cooking liquor dissolves the complex lignin cement in the wood but leaves the cellulose fiber intact. Because of its corrosive nature, the waste liquor from this process is difficult to evaporate and burn. For years there has been constant study of methods for disposing of it, thousands of articles have been written about the problem, over two thousand patents have grown out of it, and the lifetime of many a man has been devoted to investigating it. Yet up to fairly recent times, no suitable methods of disposal had been developed.

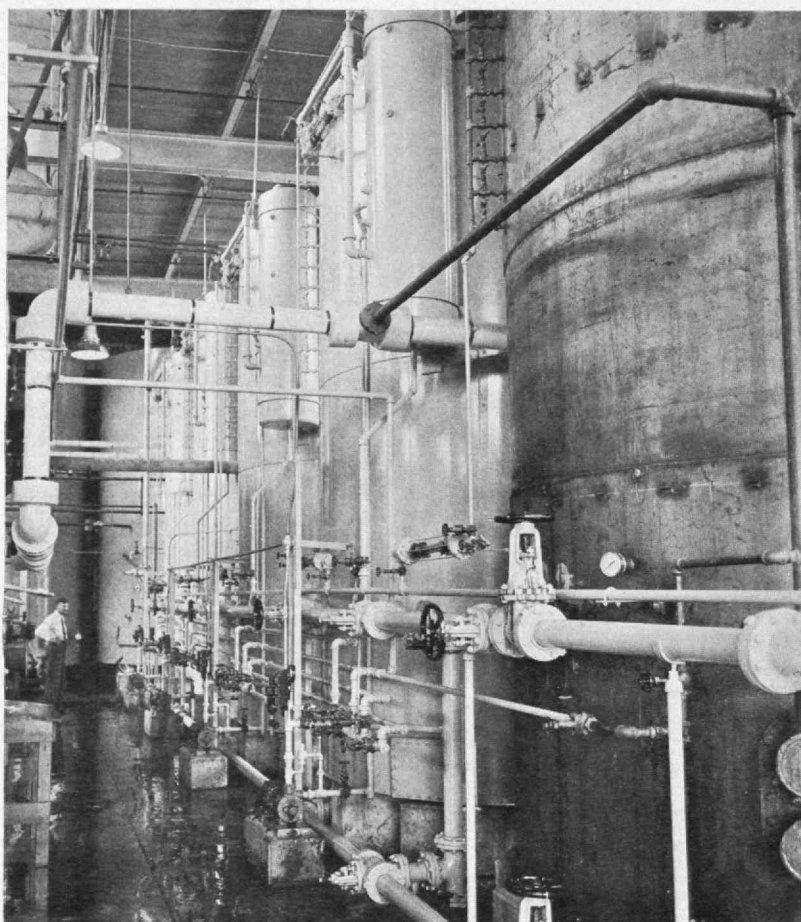
Sulphite waste liquor is a nuisance because it depletes the normal content of oxygen in water and thus may cause the death of fish. Of more importance is the appalling economic waste which it constitutes. When wood is pulped by the sulphite process, about one-half remains as cellulose fiber; one-fourth goes in the waste liquor as sugars and one-fourth as colloidal lignin derivatives. Since the world production of sulphite pulp is about 10,000,000 tons annually, the corresponding waste of lignin material is 5,000,000 tons. In the United States alone, more than 1,000,000 tons of lignin are lost each year.

When wood breaks down chemically in the earth, it yields coal, a substance which is distilled to furnish gas and coke, leaving tar as a by-product. For years efforts were made to get rid of this obnoxious waste. Then chemists learned how to use the ill-smelling tar as a base material, from which were developed many important dyes, drugs, perfumes, and explosives. Today coal tar is the tail that wags the dog. When wood is broken down chemically in the manufacture of pulp, it yields cellulose fiber and sulphite waste liquor as a by-product. This liquor contains sugars, resins, and the reaction products of lignin. The chemist is doing things with this by-product which some day may be more important than the pulp. Until 15 years ago, practically all recovery of sulphite waste liquor was based on evaporation. This procedure gave a complex



*A pattern  
plate made  
from lami-  
nated lignin  
sheets*





W. I. La Certe

*Equipment used in the manufacture of vanillin from lignin*

mixture of inorganic and organic compounds, which appeared as a thick, sticky, dark-colored, strong-smelling liquid. The process was expensive because the original liquor contained only about 10 per cent of solids and had to be concentrated to 50 per cent in order for the solids to be burned.

To a small extent, the evaporated liquor has been used for various commercial purposes — sometimes as a core binder in foundries, as a means of laying the dust on roads, or as an adhesive for fastening linoleum. Some tanning compositions are prepared from the concentrate. In Germany and some of the Scandinavian countries, alcohol is made by neutralization, fermentation, and distillation of the waste liquor. Attempts have been made to produce alcohol in the United States by this method, but the cost is considerably higher than with other available materials. Even under war conditions, whether we shall resort to sulphite waste for the manufacture of alcohol is doubtful. Still another use is being made of the by-product sugars: Several pulp mills in Canada and Sweden employ these carbohydrates as food for the production of yeast. Through the use of proper cultures of yeast and conditions of growth, satisfactory results are being obtained.

A review of the foregoing applications of sulphite waste liquor reveals that working with a complicated mixture of inorganic and organic compounds hampered utilization. Furthermore, there were inherent difficulties in the evaporation of a corrosive liquor of this

sort, which required special metals and resulted in high costs. Increasingly apparent became the fact that more logical and satisfactory usage would result if the components of the liquor could be separated. Hence a research of this type was started 15 years ago under the supervision of Guy C. Howard. Out of the work have come commercial methods which rely on segregation of the major ingredients in the waste liquor by fractional precipitation. About 90 per cent of the total liquor is segregated for treatment; the remainder, diluted with wash water, passes to the sewer. Lime reagent is added to the liquor in progressive stages under controlled conditions, whereby a calcium sulphite product is recovered for use in the preparation of cooking acid, and a lignin product is precipitated and recovered by filtration. The chocolate-colored lignin precipitate is taken off on a vacuum filter; the filtrate, consisting principally of sugar derivatives and some residual lignin, goes to the sewer. From research work now in progress, some economic use may be found for these sugars.

The precipitation treatment serves to segregate the components of the liquor for better utilization, to reduce considerably the oxygen demand of the liquor, and hence to improve stream conditions. The recovered lignin material can be used as boiler fuel if desired. At some mills favorably situated as to costs of lime, sulphur, and coal, the credits for reclaimed cooking chemicals and fuel will closely balance the total costs of operating the recovery. For most mills, however, the disposal of these liquors will involve expense, unless profitable market outlets for lignin materials can be developed.

The lignin obtained from the waste liquor is in the form of a basic calcium ligninsulphonate. This and a few other basic salts are insoluble in alkaline liquors, but they disperse or dissolve in neutral or acid conditions. The calcium salt may be dried and marketed as an intermediate for other preparations, or it may be converted into other ligninsulphonate salts or their derivatives. These sulphonates, noncrystalline compounds of high purity, are substantially free from sugars or other nonligneous organic matter. The dry salts, ranging in color from light tan to dark brown, are nonhygroscopic and free of odor. They dissolve in acid, neutral, and alkaline solutions, giving colloidal dispersions. Though they are practically insoluble in all organic solvents alone, most of them will dissolve in mixtures of water and certain organic solvents. These sulphonates, obtained by precipitation, are of much higher purity and suitability for commercial use than are corresponding by-products resulting from evaporation of the whole sulphite liquor.

In considering lignin as an intermediate for other products, some people feel that it may be a rival of coal tar. To produce delicate (*Continued on page 458*)

# Who Is the Research Man?

## *Dependable Answers to This Question Are Essential for the Prospering of Knowledge and the Best Interests of Industrial Laboratories*

BY JOHN MILLS

INDUSTRIAL research has a long history; organized industrial research, a story covering hardly 30 years. Small industrial laboratories, practically one-man affairs, with profitable invention as part of their purpose, prepared the way for the large co-ordinated enterprises of today. The successes of these pioneering establishments, and the necessity that the inventions emanating therefrom be followed by further laboratory work, demonstrated to more and more industrialists the profitable possibilities of applied science. Even today, however, many in positions of financial control remain shortsighted toward the possibilities of research. The prospecting days and the days of attic inventions to be bought for a song have not been outlived. Nor is it always realized that invention demands a broad and deep base of scientific knowledge in addition to ingenuity and persistent cut and try.

Beneath the efforts of all the pioneering laboratory workers and inventors of the last few decades of the past century was a rapidly widening foundation of scientific knowledge codified and disseminated by technical schools and colleges, whose part in invention was not always recognized by inventor or public. Today organized industrial research stands foursquare upon knowledge correlated by universities and technical schools, recognizes its debt to those institutions, and, in turn, contributes much new knowledge for their conservation and dissemination.

"Without a fund of scientific knowledge from which to draw and without a supply of men sufficiently prepared to apply that knowledge, the industrial research laboratory could not exist," wrote Howard R. Bartlett, Head of the Department of English and History at Technology, in the survey of American industrial research which he contributed to the able report \* of the National Research Council. "By the end of the nineteenth century," he continued, "both of these requirements had been met, and in addition industry had come to realize, from the accomplishments of the works chemist and the individual experimenter, that many of the problems which defied rule-of-thumb methods would yield to the application of science."

In the United States, the rise of industrial research was undoubtedly delayed by our seemingly inexhaustible natural resources and by the immediate problems faced by our captains of industry, who were concerned not with efficient and economical methods of production but rather with the control of resources, the transporta-

tion of materials, and the adequacy of supplies of labor. When manufactured goods could be sold in large volume and at adequate profit, their producers did not feel compelled to search for new methods and new products. High, restrictive tariffs, most avidly sought by manufacturers, concealed the need for a scientific attack upon important problems. On the other hand, in fairness to the tariff laws, Professor Bartlett points out that they "undoubtedly made it easier for many industries to become established, and the combination of small industrial units into large corporations made it possible for the latter to support costly research." Today, of course, research is usually an enterprise to be efficiently conducted only by large units, whether those are industry, government, endowed foundations, or academic institutions.

Serving to postpone industrial research likewise was the businessman's mistrust of the chemist — the scientist most frequently consulted — combined with the academic researcher's scorn for the person who sought to apply "pure" discoveries to "routine" enterprises. To the university scientist, the search for truth was all important and its application not important. Science was to be pure, and to many that meant sterile. A senseless gap existed between "pure" and "impure" science, which by now has been closed except in the minds of a very few intransigents.

During the middle years of the past century, however, an infiltration of science into industry began, which was assisted in large part by the farseeing and public-spirited enterprises of men like Stephen Van Rensselaer, who in 1824 established a school in Troy, N. Y., for "instructing persons . . . in the application of science to the common purposes of life"; Joseph E. Sheffield and Abbott Lawrence, whose donations made possible the establishment of scientific schools at Yale and Harvard, thus bringing applied science into those seats of academic and religious culture; William Barton Rogers, who established the M.I.T.; Asa Packer, who made Lehigh possible; and Edwin A. Stevens, whose will provided the original funds for the institute which bears his name. Men like these had the vision and generosity to lay firm bases for technical education. Gradually the universities added science and some technology, although for years "the student preparing for an industrial profession was not considered as of the same caste with the student preparing for a 'learned profession.'"

A factor exerting wide influence was the Morrill Act of 1862 that initiated the so-called land-grant colleges, of which Purdue University, Pennsylvania State

\* *Research — A National Resource. II. Industrial Research* (Washington: United States Government Printing Office, 1941).



College, and the M.I.T. as well are examples. The act, which emphasized agriculture and the mechanic arts and definitely provided for instruction in military tactics, did not preclude the classics and unapplied science. From that provision have sprung most of the important state-endowed institutions of the West and Middle West, all of which are training students in science and engineering and many of which are doing good research in their graduate schools.

Slowly, as a result of the general dissemination of science and the pressure of competition, industries began occasionally to call on professors as consultants and to make use of commercial chemists. The chemists who were at first added to the work forces of industry were used principally to test, sample, and control existing processes. Some of these early chemists soon expanded their fields of work and did remarkable research.

The other type of research laboratory, much more the one-man kind and directed to a greater extent toward invention, was the type which inventors set up for themselves. Many of these men had only a smattering of the scientific knowledge then available. Skill, ingenuity, persistence to the point of obstinacy, and the most necessary of all characteristics — curiosity — were their all-important stock in trade. And those qualities sufficed in a day when scientific nuggets were to be picked up by the observing although passed up by the masses and by most of the trained scientists.

In the transition period between unsystematic research and organized industrial research — approximately from 1875 to 1910 — important advances were made by inventors. Most of these inventions resulted in the establishment of laboratories for the testing and control of products and for the modification and extension of them. Whereas new materials, designs, and processes had been coming largely from practical men in shops or from curious amateurs of inventive turn, future developments were to come largely from trained scientists and engineers co-operating in organized attacks on specific fields of inquiry. Great inventors continued to appear, and let us hope they will always do so, but more and more the results of extensive research were becoming the raw materials upon which inventive talents could be exercised. Working in conjunction with their research colleagues, and outwardly not distinguishable from them, were men interested primarily in the practical applications of the newly acquired knowledge.

It is in attitudes of mind that research workers are distinguished from their fellows. We recognize that human beings divide, as J. McKeen Cattell once suggested, into three categories: first, those who are most competent and satisfied when dealing with human and emotional relationships; second, those competent and satisfied when dealing with material things and definite situations; and third, a very small group, those similarly oriented toward abstractions and physical or philosophical situations, whether of words or symbols — in general, those interested in the theoretical consideration of either our animate or our inanimate universe.

Men seem to differ according to whether their primary interests are in ideas, in things, or in men; extreme and oversimplified illustrations are philosopher, crafts-

man, and statesman. Thus we have three distinct mediums for self-expression in a career, although the interests of most men are broader and overlapping. If the preferential order is ideas, things, men, the aptitude might well be for research in the physical sciences; if ideas, men, things, then research in psychology and human relations is suggested. If men are placed first, the indicated activity is management, politics, or religion. When things are first, it is engineering, manufacturing, or construction, particularly if men are second; but it would be development work, design, invention, or individual craftsmanship if ideas were second and men third. The analysis is made more illuminating by the addition of a fourth medium, represented by the dollar sign — not the dollars we carry in our pockets, but rather an abstraction: the dollar as a goal, a game, a medium for a career. If the dollar symbol appeals as comparable with the other three symbols — ideas, men, and things — neither engineering nor research is indicated.

The research man instinctively states his preferred mediums in the following order: ideas, things, and men, with the dollar a poor fourth; for research is primarily but not exclusively an interest in ideas, secondarily an interest in the embodiment of them in things for the use of man, and least a matter of money. But that fact does not mean advocacy of a frugal livelihood as society's return for research accomplishments!

Another picture of the research mind comes from study of the motivation of a career, the forces which keep the wheels of individual progress rolling. Three inducements are obvious: the first, an economic urge, a desire for more of the things which money can buy; the next, ambition, a desire for approbation, whether from the masses, one's peers, one's conscience, or one's God; and the third, most conveniently described by the term introduced by Veblen, "the instinct of workmanship." This is the play instinct at work — the drive that makes one person, for the sheer fun at the time and without regard to consequences in money or credit, do something which another might consider work.

To illustrate this matter of urges, imagine a man who is assured for life of a job which gives him an income sufficient to mean freedom from irking financial limitations provided that his production does not fall materially below its present average. What will urge him to greater effort, to more and better work? Will it be the desire for still more money and the things it might buy? Will it be hope of greater reputation or higher rank and authority? Or will it be the pure fun of accomplishment, the play instinct at work — creation and production for their own sakes?

The research type of man will ordinarily ascribe a mere token of 10 per cent to the economic motive, perhaps 40 to ambition, and 50 to the instinct of workmanship — to inquiry, construction, and creation for their own sakes. It is this inquiring interest in ideas which distinguishes the research worker. In any large industrial laboratory, men working side by side on related phases of a problem may appear to an observer to be performing similar operations, whereas one is actually doing research and the other is engaged in engineering. An extension of this idea is (*Continued on page 466*)

# THE INSTITUTE GAZETTE

PREPARED IN COLLABORATION WITH THE TECHNOLOGY NEWS SERVICE



JAMES H. DOOLITTLE, '24  
*Recipient of the Congressional Medal of Honor*

## *Wings over Tokyo*

**A**N HONOR of which all Technology men are proud came to James H. Doolittle, '24, brigadier general, United States Army, when he was called to Washington on May 19 to receive from President Roosevelt the Congressional Medal of Honor—the nation's highest award—for his epic achievement as leader of the American bomber squadron which attacked Japan on April 18. At the White House ceremony, the citation for the medal was read by General George C. Marshall, chief of staff, United States Army.

General Doolittle's flying career began in the first World War when in 1917 he joined the Army as a private. He was awarded the degree of master of science by the Institute in 1924, after completing a thesis on "Wing Loads as Determined by the Accelerometer." The new knowledge developed in his research for his thesis was widely recognized as an important contribution to aeronautical engineering and was applied in new designs for aircraft. A year later General Doolittle was awarded his doctorate, the fourth recipient of this degree from Technology, for which he completed a thesis on "The Effect of the Wind Velocity Gradient on Airplane Performance."

In 1922 he made an important cross-country flight, which won for him his first decoration, the Distinguished Flying Cross, to which was later added the oak-leaf cluster for other notable flights for the Army. During this period of his career he set a world's seaplane speed

record when he flew in the Schneider Trophy Race. In 1930 he won the Harmon Trophy for his contributions to the safety of flight through blind flying tests. He also holds the Bendix Trophy and the Spirit of St. Louis Medal. In 1940 he was elected president of the Institute of the Aeronautical Sciences.

## *Postgraduate*

**D**EGREES were awarded to 186 candidates at the graduation exercises of the Institute's Graduate School, held in Walker Memorial on the evening of May 28. This year's degrees, which were presented by Dr. Compton, included 20 doctors of philosophy, 16 doctors of science, 1 doctor of public health, 1 master in architecture, 3 masters in city planning, 6 masters in public health, and 138 masters of science. It was the first separate postgraduate commencement and the first graduation exercise to be held in Morss Hall, which was filled with members of the families and friends of the graduates. The academic procession included officers of the administration led by Dr. Compton, as well as members of the Corporation and the Faculty.

## *For Students to Serve*

**T**HE special opportunities and obligations confronting students of the Institute as a result of the war were discussed by President Compton at a general convocation on May 23. "The compelling urge of every American citizen and every American institution," he said, "is to bring this war quickly to a successful end. We are determined to put a stop to aggression and drive aggressors from the world. The question for colleges is how we can most effectively help our country to make these purposes come true. Thus, what can Technology best do to help win the war?"

Dr. Compton expressed his belief that first priority should be given to the education and training of scientists and engineers to the highest degree of competence. "Our national policy," he said, "recognizes the urgent need for competent technical men and the importance of having students continue their professional studies in science and engineering. We are convinced that for most of our students this policy is in line with the best national interests, and we are directing our efforts and influence to this end."

In concluding his address, Dr. Compton said: "You and I both realize that conditions may dictate changes both for the Institute and for individual students. If changes become necessary, I can assure you that we will do our level best to maintain Institute educational standards and that we will not yield these standards except as it can be demonstrated that by yielding them we can make more important contribution to our national effort."



Speaking of the Selective Service Act, he said that the Institute undertakes to request deferment for students who are preparing for work in essential occupations, who are in high standing at the Institute, and who show promise of making significant contributions to the national welfare in professional capacities. "We feel," he said, "that any decision to submit a deferment request should be made by the student and that in making this decision he should ask himself, 'In what capacity shall I be serving the best interest of the country?'"

At the convocation Dr. Compton announced establishment at Technology of the Army's new Enlisted Reserve Corps program for students. The purpose of this program, as announced by the War Department, is to insure from college students a future source of qualified officer candidates for the Army and, to the extent necessary to accomplish this purpose, to encourage students to enroll and continue in college. Enlistment, President Compton explained, is wholly voluntary, and no student need feel that he is under any compulsion or influence from the Institute to do so. Enlistment in the corps provides that if the necessity of war demands it, the Secretary of War may call members of the corps at any time.

Students also have the opportunity to take advanced military training in the Reserve Officers' Training Corps, upon the successful conclusion of which they will receive commissions. Enlistment in the advanced R.O.T.C. course automatically includes enrollment in the Enlisted Reserve Corps. Under certain conditions, exceptionally promising students in the Enlisted Reserve Corps may, upon completion of their academic training, be deferred from active duty and permitted to take industrial posts.

Because the M.I.T. is a land-grant institution offering basic military training for all students in the first two years and advanced military training for selected students in the upper two years, the V-1 program of the United States Navy is not open to Technology students. Under the army program, however, a certain number of students completing their second year may apply for transfer from the Enlisted Reserve Corps to the Navy's V-7 Reserve. The practice of permitting a limited number of advanced R.O.T.C. members to transfer to the Naval or Marine Corps Reserve in their senior year will also be continued. Juniors and seniors without previous enlistment, it should be noted, may apply for probational commissions in the Navy in the specialist branches. They may also enlist in the V-7 classification for general service and remain at the Institute under present conditions until they have completed their Courses. They will then be sent to a reserve midshipmen's training school for further instruction before being commissioned.

"Within the limits permitted under the Selective Service Act and these enlistment plans," said Dr. Compton, "whatever a young man does is a matter for decision by his own conscience and intelligence. There is no one pattern which is right for everyone, except the broad pattern by which all of us try, to the best of our ability, to devote our energies in the direction where they are needed."

## Rubber, Reports, Restoration

THE Alumni Council closed its activities for the academic year with its 227th meeting, held on the last Monday of May. Harold Bugbee, '20, Vice-president, presided in the absence of President Hutchinson, '09, and during the dinner introduced the new Association officers and Council members. Annual reports from committees, officers, and advisory organizations of the Council followed; in all, they indicated a successful year's operations despite present disturbances. William G. Perry, '07, whose architectural firm of Perry, Shaw and Hepburn ['03] carried out the restoration of Williamsburg, Va., was the speaker of the evening. He gave an intimate picture of John D. Rockefeller, Jr., and of his attitude and objectives in making possible the restoration. Mr. Perry then dealt with details of construction, landscaping, and general planning.

At the 226th meeting of the Council, on the last Monday in March, Ernst A. Hauser, Associate Professor of Chemical Engineering at the Institute, was the chief speaker. He surveyed the present and future rubber situation of the country, discussing the various handicaps existing and possible ways of meeting them.

## Visiting Committee Reports

REPORTS of two Corporation Visiting Committees are presented in condensed form below.

### DIVISION OF INDUSTRIAL COÖPERATION \*

ALL the members of the Committee were present at the meeting on January 7. The Committee was informed, in reviewing the work of the Placement Bureau, that graduates who were taken directly into the Army were often sent to a branch of the service in which their special training at Technology did not particularly fit them and thus the most valuable part of their training was not used. In the hope of providing a remedy for this difficulty, the Committee voted as follows: If men in the Reserve Officers' Training Corps are called into military service, they should be placed in the branch where their technical training will allow them to be used most efficiently. It is recommended that means be found to bring to the attention of the War Department cases where graduates of M.I.T. appear to be in the wrong branch of the service so that appropriate transfers can be suggested. [Editor's Note: This recommendation has been discussed with the War Department, and transfer of men from one service to another under appropriate conditions is now possible.] It was noted that in the Navy, graduates of Technology were usually allocated to work appropriate to their training.

The attention of the Committee was called to the fact that in the training of candidates for bachelor's degrees, 170 credit hours were spent on nonmilitary subjects and 30 credit hours on military subjects. Certain members of the Committee felt quite strongly that these young men could get more valuable special training if they

\* Members of the Committee for 1941-1942 are W. Cameron Forbes, Chairman, B. Edwin Hutchinson, '09, Edward P. Brooks, '17, Ralph D. Booth, '20, Uncas A. Whitaker, '23, William Steinwedell, '25, and Isaac Harter.

used for technical studies the 30 hours now spent for military subjects. It was suggested that this matter be called to the attention of the President and Executive Committee of the Institute with the suggestion that the situation be explored, although the Committee was not prepared to make a definite recommendation of a change. An interesting fact is that 80 per cent of the graduates of the Institute find employment outside of the six New England states.

The Committee, being interested in ascertaining the particulars of the administration of the war research program administered through the Division, has secured from the Treasurer of the Institute important information in regard to the business methods adopted in securing authorizations for each expenditure and arranging for payments, accounts, and safeguards for government property, and has asked information on results.

As the nature of this work is very largely confidential, the Division made no report on just what projects were being taken up or the results achieved except the general statement that the results had been to an important extent satisfactory to the government and that additional services were constantly requested. The Committee feels that the Institute is to be congratulated upon being in a position to take on this major work in the service of the country in time of emergency. The fact that the government has entrusted to the Institute this extremely important work is a compliment to Technology's organization and especially to the quality of the personnel engaged in scientific research connected with its activities. The Committee does not hesitate to recommend that the Institute continue to meet to the fullest extent the requests of the government for services that it is in position to render.

The Committee, however, recognizes that where work is being done for the government the utmost care

should be taken to make sure that the best business methods of auditing, checking vouchers and property returned, paying of government money whether for wages, materials, or services of the Institute or its paid officials, should be used with the most scrupulous heed to prevent waste or expenditures for objects other than called for in the contracts. Thus the Institute will be prepared to meet rigid scrutiny.

The Committee is glad to report that the Treasurer of the Institute feels he has complied with these requirements, and the auditor, with whom the Chairman of the Committee has consulted, has shown his report, which indicates that some of the earlier difficulties were ironed out, and the work is being carefully and accurately done. In its present form, the organization is prepared to take on such new responsibilities along these lines as it may be called upon to meet. One difficulty and danger in the present situation is that the government calls for work on this new and vast scale but as yet has not provided a revolving fund to meet the payments as they come due, and there is a lapse or lag of two or three months between the time the bills are rendered to the government by the Institute and payments are made. [Editor's Note: In accord with a recommendation of the Committee, new contracts are now being written providing for payments to be made one month in advance.]

#### DEPARTMENT OF BUILDING ENGINEERING AND CONSTRUCTION\*

**T**HE Committee last March considered the introduction of an option in the Course in Building Engineering and Construction which would meet the present

\*Members of the Committee for 1941-1942 are Harry J. Carlson, '92, Chairman, Lewis E. Moore, '02, Page Golsan, '12, George W. McCreery, '19, William E. R. Covell, '23, Joseph K. Gannett, and Irving B. Parkhurst.

*First to enter the new Enlisted Reserve Corps of the Army were these two M.I.T. students: Theodore F. Randolph, '45, of Birmingham, Ala. (left), and James A. Leonard, '45, of Joplin, Mo., shown as they were sworn in on June 4 by Jerome L. Spurr, '27, major, Corps of Engineers Reserve, who is assistant professor of military science and tactics at the Institute. Also shown in the photograph are John D. Mitsch, '20, Associate Professor of Civil Engineering, who is adviser to students on Reserve plans; and Edward W. Putney, colonel, Coast Artillery Corps, who is in charge of the Department of Military Science and Tactics.*



M.I.T. Photo



need for training in the field of light construction with particular reference to housing. Called to the attention of the Committee was the fact that the portion of the industry at present interested in housing felt that most courses in building construction and architecture did not fit men for this type of work, because they came into it with a state of mind not compatible with mass production plans. These organizations have often stressed the point that the training given students at Technology was exceptionally thorough, but that the addition of a considerable number of business courses would be of distinct advantage. Because nearly 60 per cent of the construction volume under normal conditions is centered around housing, and because much of this construction is now carried on in a more or less haphazard manner by many so-called speculative builders, it was wise to consider the future infiltration of properly trained engineers into this field. The Department, therefore, suggested that greater attention should be paid to the business and industrial implications in training men in building.

The Committee felt that the establishment of a curriculum aimed at these suggestions was desirable and proposed that two options be offered in the Department of Building Engineering and Construction, one to be designated heavy construction, and the other light construction. It was decided that these two options should be identical for the first two years, and that the third and fourth years of the heavy-construction option should continue as at present. The light-construction option should afford the student considerably more training in the business aspects during his two last years. The Committee suggested that a curriculum embodying these general principles should be prepared and submitted to the regular Institute authorities for approval, and that the degree in any case remain as at present, namely bachelor of science in Building Engineering and Construction. This has been done and now has the approval of the Faculty. Registration for the light-construction option will be possible for young men entered in the Class of 1945. It is interesting to note the time allotted to various phases of the student's training in each option:

	Option 1 Heavy Construction	Option 2 Light Construction
Humanities.....	12 per cent	10 per cent
Economics.....	2	7
Science.....	25	25
Architecture, Construction, and Materials..	17	17
Engineering.....	38	27
Business.....	2	12
Electives and/or Thesis	4	2

The possibility of registration for the new option, aside from any repercussions which the present emergency may have, seems reasonably assured. It is felt the curriculum will be one of the first attempts by a school such as Technology to make this field of study available from a thoroughly scientific point of view.

## Pops

**S**PONSORED by the Alumni Association, Tech Alumni Night at the Pops on June 6 was an entire success, Symphony Hall in Boston being sold out. The

large number of Technology people who attended were led in the singing of "Take Me Back to Tech" and of "A Stein Song" by Henry Jackson Warren, conductor of the M.I.T. Glee Club. Thus the tradition of Tech Night at the Pops, an activity of undergraduates in normal times, was maintained. Arrangements for the affair were handled by the Alumni Day committee, of which Raymond H. Blanchard, '17, was chairman.

## Rogers Awards

**W**ILLIAM BARTON ROGERS awards of \$300, which are given annually in memory of the founder and first President of the Institute in recognition of high scholarship, character, and leadership in student affairs, were presented to these six members of the recently graduated Class of 1942: Jerome T. Coe of Madison, Wis.; Francis B. Herlihy of Roslindale, Mass.; Harry E. Knox, Jr., of Philadelphia, Pa.; Carthrae M. Laffoon, Jr., of Irwin, Pa.; Karl E. Wenk, Jr., of Old Greenwich, Conn.; and Ray O. Wyland, Jr., of Scarsdale, N. Y. They received the awards from President Compton, in the presence of the heads of the academic departments in which they were studying and the Faculty Committee on Undergraduate Scholarships, of which Dean H. E. Lobdell, '17, is chairman.

Coe, a graduate of Phillips Exeter Academy, was president of the Institute Committee and is permanent president of the Class of 1942. Herlihy came to the Institute from Boston Latin School and was president of the M.I.T. Athletic Association. Knox, a graduate of William Penn Charter School of Philadelphia, was president of the Beaver Key Society and secretary of the Interfraternity Conference. Laffoon was graduated from Norwin High School in Irwin, Pa., before coming to the Institute, where he became editor of *The Tech* in his junior year. Wenk, a graduate of Greenwich High School, was chairman of the undergraduate budget committee. Wyland came to the Institute from the Horace Mann School for Boys, New York City, and was general manager of the M.I.T. Musical Clubs.

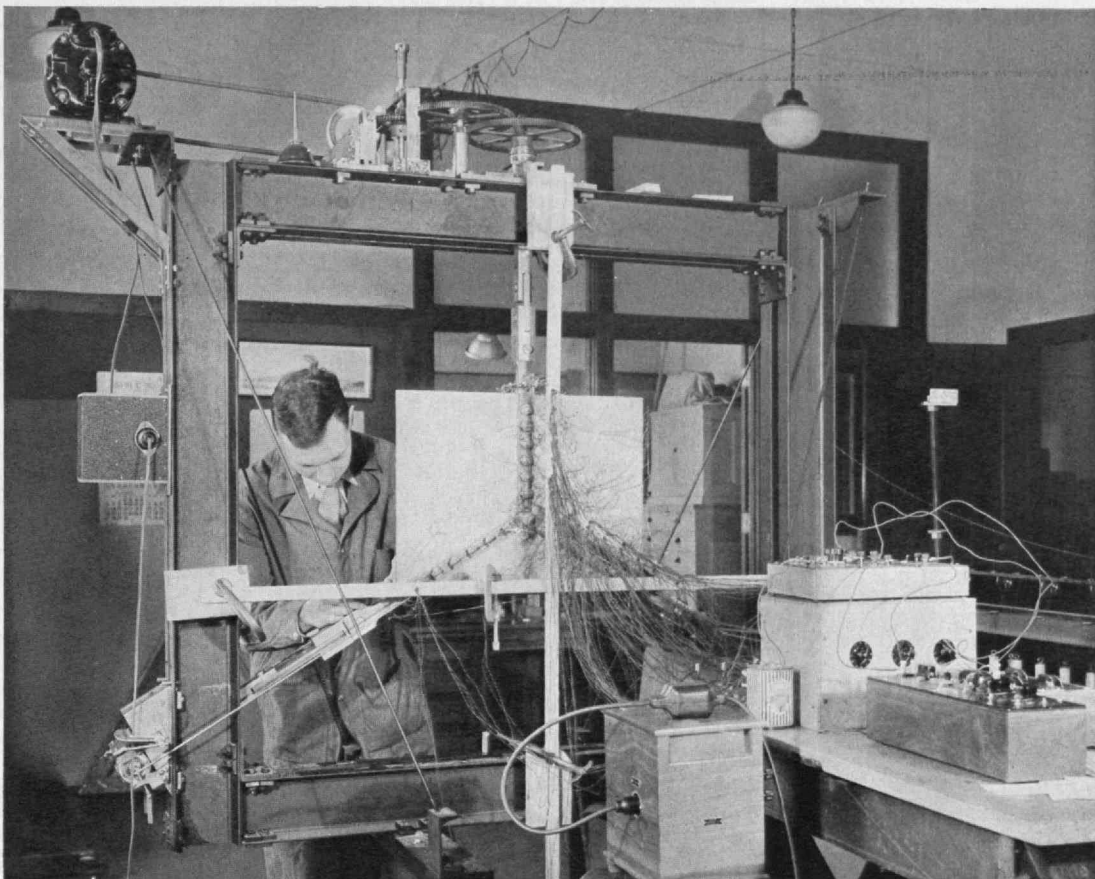
## For Thrifty Insulation

**I**NSULATING material which lines the walls of a house has what may be called a standard job to do—that of helping to maintain a reasonably constant temperature over a considerable period of time. In cases such as this, the most important property of the insulating material is thermal conductivity. Insulation lining the walls of the big ovens in a bakery, those of a refrigerator truck, or those of any other structure which must be heated or cooled at fairly frequent intervals has a rather different task. For this second task, other properties of insulating materials—such as specific heat and density—may be of more importance from an economic point of view.

When a house is to be blanketed with an insulating substance, not much attention need be given to the question of how much heat must be poured into the insulation itself to assure even temperature within a dwelling, for once the insulation has been brought to the right point, it can be expected to stay there for

In the Structural Analysis Laboratory of the Department of Civil Engineering at Technology, a program of research is being directed by John B. Wilbur, '26, Associate Professor of Structural Engineering, with the aim of developing fairly simple methods of determining the correct stress distribution in the gusset plates used to join main members together in riveted and welded structures. Present design of gusset plates too often follows rule-of-thumb procedures, and when effort is made to analyze the stresses in such plates, it is generally very tedious and unsatisfactory. The development of methods more nearly accurate or more readily applicable, or both, is therefore extremely desirable.

In our illustration, one part of the study is shown. Loads are being applied to a simple gusset plate, and the distribution of resulting stresses is being determined by means of electrical strain gauges affixed to the surface. The directions of the principal stresses are first found through a varnish technique devised at Technology by Greer Ellis, '38, research assistant in the Department of Mechanical Engineering, and their magnitudes are ascertained by means of the strain gauges, which were developed by Arthur C. Ruge, '33, Assistant Professor of Engineering Seismology. Frederick G. Lehman, '39, assistant in Civil Engineering, who is conducting this part of the work, is shown adjusting the apparatus.



M.I.T. Photo

months. If the insulation is in the walls of an oven, however, and must be heated up every day, costs both in time and in money must be reckoned with.

Study of the specific heats of a number of representative insulating materials, which has been done in the heat measurements laboratory at the Institute, hence should be of direct value to insulation engineers who have to deal with installations in other than constant temperature conditions. The specific heat of a material, strictly speaking, is the ratio between the heat necessary to raise a unit of the material one degree in temperature and the heat necessary to produce a similar rise in the temperature of an equivalent mass of water. Practically, it may be defined as the heat necessary to raise the temperature of unit mass one degree. The lower the heat capacity — product of the specific heat and the density — of an insulating material, the less heat is required to bring the insulator to a desired temperature.

The studies at Technology have been carried on by Carl O. Wood, assistant in Mechanical Engineering, working under the direction of Gordon B. Wilkes, '11, Professor of Heat Engineering. Mr. Wood has tested many of the common insulating materials, including magnesia as used in wrapping steam pipes, and has run the tests up to 1,400 degrees Fahrenheit on some materials. His findings have been reduced to tabular and graphic form.

Since many insulating materials are light and fluffy, usual calorimetric methods were not practicable in the investigation, and a special dry, or metal, calorimeter was devised to meet the need. The test specimens of fluffy material were compacted hydraulically under pressures as great as 125,000 pounds per square inch, heated, and transferred to the dry calorimeter, which was made of metal of low specific heat. The rise in temperature recorded for the calorimeter, which was precisely calibrated, gave the specific heat of the test specimen. To insure against heat loss to outside surroundings, the calorimeters used were carefully shielded.

### Russian

WHEN the Institute opens next autumn, the Department of Modern Languages will offer a course in elementary Russian, which is to be given through the year. It is designed for students who wish to prepare themselves for reading scientific articles in Russian and at the same time acquire a foundation for continued study of the language in preparation for possible direct contact with the people of Russia. The great importance of contributions by the Russian scientists in various fields of research is already well known to American scientists and engineers. (Concluded on page 474)



## RUBBER — TODAY AND TOMORROW

(Concluded from page 443)

available in May. One reason which underlies this emphasis on Buna is the availability of the necessary raw materials: Its basic chemicals can be extracted from petroleum or processed from acetylene or alcohol, and the alcohol can be derived from grains and other agricultural products. In May, the Standard Oil Company of New Jersey announced that they had developed a method for extracting butadiene from petroleum without reducing the yield of high-octane gasoline. In other words, both butadiene and high-octane gasoline can be processed from the same batch of crude oil. The Standard officials reported in May that 34 aviation gasoline plants capable of making butadiene were under construction, to be in operation within a year. Another petroleum-derived rubber, butyl, is on the schedule for production by Standard as a by-product of cracking.

Whether the promise of 350,000 tons of synthetic rubber for 1943 is conservative or extravagant is difficult of appraisal. Jesse Jones and his associates assert that the full quota will be attained. But the Truman committee, after reviewing the status of plants being built under government auspices, expresses its doubts.

The committee also calls attention to the fact that, up to the summer of 1942, scrap and other junk rubber had received little attention from the authorities on rubber conservation. Our facilities for reclaiming rubber can care for approximately 350,000 tons, but the scrap collected last year was reported to provide only 275,000 tons of reclaim. Actually, our present reservoir of scrap must be somewhere between 500,000 and 1,000,000 tons, and the problem of collecting it for reclamation — one attack on which began June 15 — is certainly an essential part of our rubber program. In the future, says E. G. Holt, we may expect our rubber industry to use 10 per cent of crude, 25 per cent of reclaimed rubber, and 65 per cent of synthetic.

Whatever the speed of realization of the new program, it seems obvious that the rubber world will never return to the *status quo* of pre-war days. If the war lasts beyond 1943, the likelihood is that the rubber plantations in South and Central America, and to a limited extent those in southwestern United States, will be definitely established. Then rubber production may become a leading industry of the Western Hemisphere, as rubber consumption has been from the days of Charles Goodyear. The United States Department of Agriculture has been active in developing superior stocks of rubber-producing trees and in Costa Rica, Honduras, and Haiti has thousands of specimens of choice strains of *Hevea* which were brought from the Far East. Disease-resistant species are being supplied from these stocks to plantations in Latin America — where, incidentally, surveys show 15 countries to have areas well adapted to rubber culture. Nor must the plantation be thought of as necessarily a large tract. Loren G. Polhamus of the United States Department of Agriculture points out that 50 per cent of the rubber from the Far East was produced by planters whose holdings averaged less than five acres. An important

element of the present effort in Latin America is to help the small landowner whose labor supply is his own family.

Meanwhile, the chemical engineers will be putting into operation the tremendous program for synthetic rubber. Present synthetics are superior to natural rubber in resistance to deterioration by oils and organic solvents, in resistance to oxidation and aging, and in lower permeability to gases. But natural rubber is more elastic than any synthetic, is more resilient, endures freezing better, and is easier to process. These conditions, of course, may change. For while the chemical engineers are putting the industrial schedule into effect, the research chemists are not idle. In a sense, our 800,000-ton program is a vast experiment. Out of it improvements are certain to come: new ways of processing, clues to raw materials which give better results, short cuts which save costs, new uses, and new qualities. That the chemists will attain a synthetic of greater elasticity and resiliency than any existing laboratory product is not too much to expect. Doubtless there will always be uses for which caoutchouc will be superior; but as our molecule makers increase in experience and skill, they will be able to tailor rubber-like materials to a particular need. The vista that such a future opens is endless.

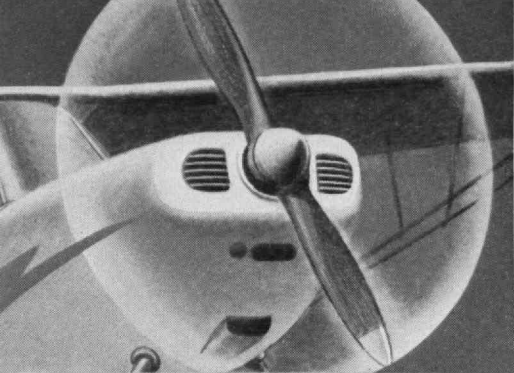
## LUCRATIVE LIGNIN

(Continued from page 450)

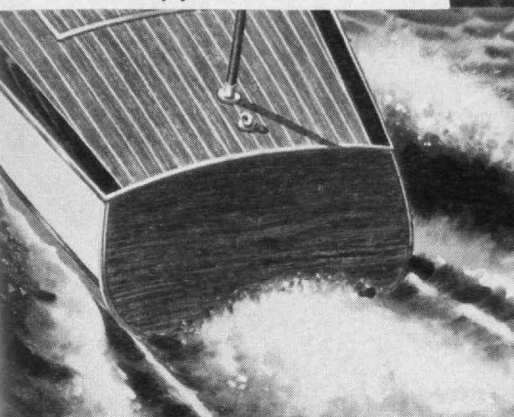
perfumes from ill-smelling tar was an accomplishment; to make vanillin from a by-product of wood pulp is also an achievement. This white crystalline powder has a sweet odor, so penetrating that the clothes of a vanillin chemist betray him the moment he sets foot in a movie theater. Each year the United States consumes a half-million pounds as flavoring in chocolate, candy, ice cream, and cake. Vanillin has been made synthetically by a number of methods for a considerable time, but the spruce lignin recovered by the foregoing precipitation process now accounts for more than one-half of the production in the United States. The process of manufacture is simple in principle but more difficult in actual operation. The ligninsulphonate is cooked with caustic soda to produce the vanillin, which is then extracted by solvents and given exhaustive purification.

The spent liquor from the vanillin process, still containing most of the lignin matter, is used in cooking chips to yield a brown, semichemical pulp of enriched lignin content. The fiber is employed for making plastics either in sheet form for lamination or as powder for molding. The pulp can be formed into fiberboard on a regular paper machine. When sheets of this board are subjected to high temperatures and pressures, they decrease to approximately one-third the original thickness, and form a hard, dense, black, waterproof product. By the hot-pressing of a number of sheets together at one time, any thickness may be built. The laminated product is one-half as heavy as aluminum and about one-fifth the weight of steel. It is tough and oil resistant, and, on an equal weight basis, has strength comparable with that of steel, as well as good physical, chemical,

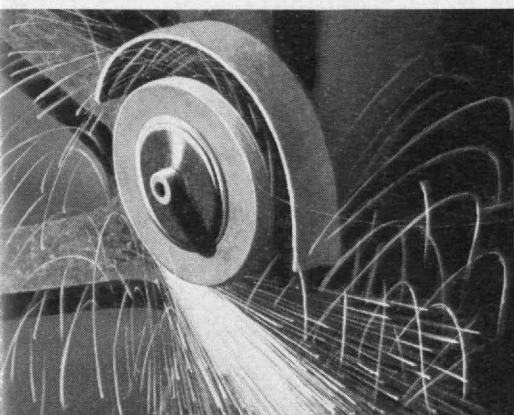
(Concluded on page 460)



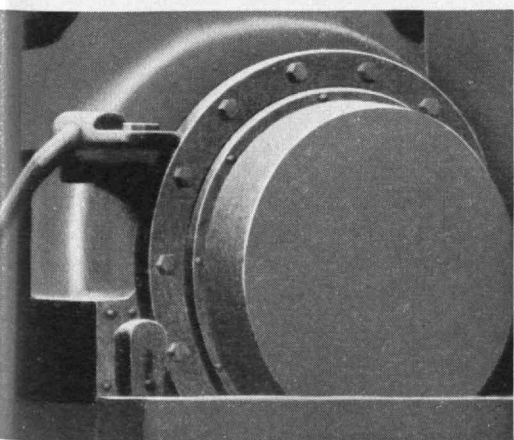
Wonder woods! Propellers and many aircraft parts are produced with "Bakelite" resin-bonded molded plywoods.



Born seaworthy! Plywoods bonded with "Bakelite" resins are ideal for boat construction. No need to worry about getting them wet. They won't de-laminate!



Speeding up production! Abrasive particles in vital high-speed grinding wheels are bonded with "Bakelite" resins.



Even the rollers that roll steel, roll on bearings made of "Bakelite" resin-bonded materials!

## UNITED THEY STAND ... most anything!

By what strange alchemy do thin, frail sheets of wood become so tough and strong...so resistant to wear and tear, to water, chemicals and decay... that builders of aircraft, boats, homes, and other structures hail these transformed woods as *marvel materials*?

The answer is found in "Bakelite" resins. These synthetic, man-made materials, which paved the way for many developments in molded, laminated, and cast plastics in common use everywhere, have gained an even broader and more basic role.

Through research... in helping to solve the problems posed by manufacturers in many fields... "Bakelite" resins have become increasingly important as *impregnating, coating, and bonding* agents. They hold materials together... and they give greater strength, greater durability, and longer life to common substances that man has used for ages. "Bakelite" resins also permit the creation of *many new materials*... materials never seen before... with possibilities that make one want to do things with them.

Developments in bonding, stabilizing and densifying plywoods with "Bakelite" resins are one phase of this story. "Bakelite" resins have also solved many problems in the fabrication of metals, carbon, abrasives, cloth, leather, paper, glass... in countless ways... in varied forms. Certain types of "Bakelite" resins have helped to establish new standards of durability for paints and varnishes.

And this is *only the beginning*. As new problems are presented... to be solved by research... a host of new uses may be expected of these efficient, versatile, problem-solving materials.

• • •

The ever-broadening diversification of materials offered by Bakelite Corporation is now supplemented by the "Vinylite" plastics developed and produced by Carbide and Carbon Chemicals Corporation. The manufacture and application of these products have been greatly facilitated by the plastics-fabricating research of National Carbon Company, Inc., by the metallurgical experience of Electro Metallurgical Company and Haynes Stellite Company, and by the metal-fabricating knowledge of The Linde Air Products Company. All of these companies are Units of Union Carbide and Carbon Corporation.

### BAKELITE CORPORATION

Unit of Union Carbide and Carbon Corporation

30 EAST 42ND STREET



NEW YORK, N. Y.





## LUCRATIVE LIGNIN

(Concluded from page 458)

and electrical properties. In general the pressed products have excellent qualities for milling, punching, and machining, for they may be handled much as are other plastics now available. If a different surface is desired, other colored sheets may be laminated to the outside during the molding process. These sheets are finding use in electrical equipment and for some other purposes. Because of light weight, high strength, and freedom from warping, they are employed widely for pattern plates, in place of aluminum.

The lignin-enriched pulp may also be converted into powder suitable for use in molding compositions alone or with auxiliary resins to form dark-colored products of odd shapes and of good physical, chemical, and electrical properties. Lignin plastics are of particular interest at this time because they serve to extend the supply of phenolic resins, which are becoming more scarce. They do not use any essential war materials and are available in large amounts at costs considerably below those of materials of comparable properties.

The ligninsulphonates are finding commercial applications in diverse fields, such as the tanning of leather, the treatment of boiler water, operations involving dispersing and emulsifying, the compounding of rubber, and the manufacture of grinding aids. In the leather industry, the cutting off of foreign sources and the blight in chestnut trees have provoked a shortage of tanning materials. The magnesium salt of ligninsulphonic acid is being used extensively in the tanning of sole, side, and other leathers. Similarly the calcium salt is serving as a filler for synthetic rubber, such as neoprene and Hycar. Although it has little or no reinforcing properties, the salt aids materially in the milling of the rubber. It imparts oil resistance, cuts down cold flow, and produces compressibility similar to that of cork. As gasket material this rubber-lignin composition is serving well in military tanks.

The sodium ligninsulphonate acts also as an agent for deflocculating, dispersing, or emulsifying materials in liquids. One application is in the preparation of dye dispersions and another is as a leveling agent in the tanning of leather. An important use is as a grinding and dispersing aid, particularly in the manufacture of Portland cements of high early strength.

Although this discussion has been concerned principally with the applications of lignin, an enormous amount of research has preceded these uses. Lignin in wood appears to be present partly in true chemical combination with the cellulose and partly uncombined. Though the chemical constitution of cellulose is quite well known, that of lignin is still unsolved. Considerable information is available on the chemical groupings in the lignin molecule, and a solution of the problem may reasonably be expected soon. Complete knowledge of the composition of lignin should lead to simpler and more economical methods in the manufacture of pulp, with better by-products. These materials will serve as intermediates for the synthesis of aromatic products, some of which are presently known and others of which are to be developed.

## JOHN DOE, SABOTEUR

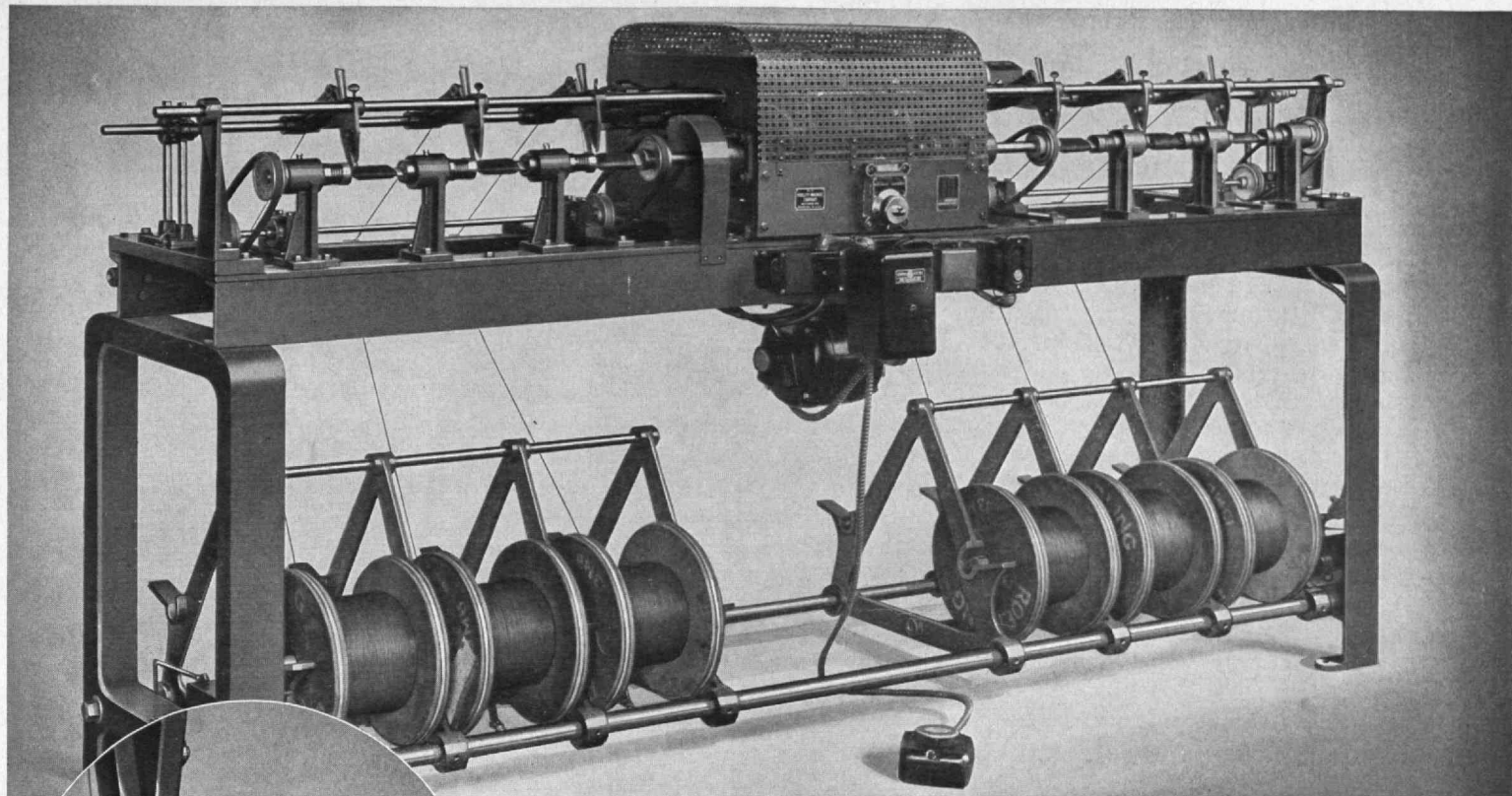
(Concluded from page 448)

emphasizes the dual role of fire as Public Benefactor Number One and Public Enemy Number One. Without it as a friend, our industrial progress would be halted. Because of it as an enemy, our war effort is hampered. Prompt detection of fire and prompt extinguishment of it must go hand in hand. The Statler Hotel in Washington, under construction for reported use by the government, burned last February because of lack of adequate precautions in the use of wooden forms and nonflame-proof tarpaulin. Though the fire station was less than a block away, wind so spread the flames that they gained terrific headway before the first hose stream could be turned on. Delay can be fatal, as in the water-front fire in Jersey City on May 31, 1941, which resulted in a loss of \$5,000,000. Employees tried to put out the fire and delayed calling the fire department. Cattle pens, a wooden wharf, a grain elevator, a second pier, several barges, and part of a large "fireproof" warehouse were destroyed. In Bladell, N. Y., last August, an abrasives plant was destroyed with a direct loss of \$1,000,000—but far worse, full production by many other factories working on vital war orders was delayed because of the lack of abrasive products. A new sprinkler tank recommended since 1939 had not been completed.

No citizen can delegate his or her responsibility for vigilance against the saboteur. But the word is "vigilance" not "vigilantes." Judgment and common sense are essential. "Witch hunts" are out of place; in fact, the Federal Bureau of Investigation warns against unjustified suspicion, against persecution, and against hysteria. This warning does not mean that everything which appears innocent enough in ordinary times is safe in wartimes. The parking of vehicles near bridges, under overpasses, adjacent to power plants, and so on, is no longer to be tolerated. Such persistent practices should be reported to the authorities, for even though the vehicle is owned and parked by a wholly innocent citizen, it can be used as a cover for the saboteur.

Water supplies, communication facilities, and public utilities of all sorts must be adequately and constantly protected. The problem is rendered more difficult and the danger of sabotage more acute by continued dimouts and occasional or regular blackouts. Light is one of the saboteur's worst enemies; darkness, one of his best friends. But in this strange mixture of contradiction which is modern warfare, the very violation of dimout or blackout, the very use of light itself, becomes a potent weapon for sabotage. Fire is a simple and effective way to negate even the best blackout precautions. If, at the same time, the fire can destroy war materials, premises, or utilities, it becomes doubly dangerous.

Every citizen must be alert to the difficulties of the present situation. Buck-Passing Benny has no place in any American community. He is a saboteur of a type too common in the past. He must be eliminated with the rest. The saboteur is ingenious, but industry and citizenry can themselves be productive of an even greater degree of ingenuity if they will realize the need for extra caution today and if to the "V" for Victory they add the "V" for Vigilance.



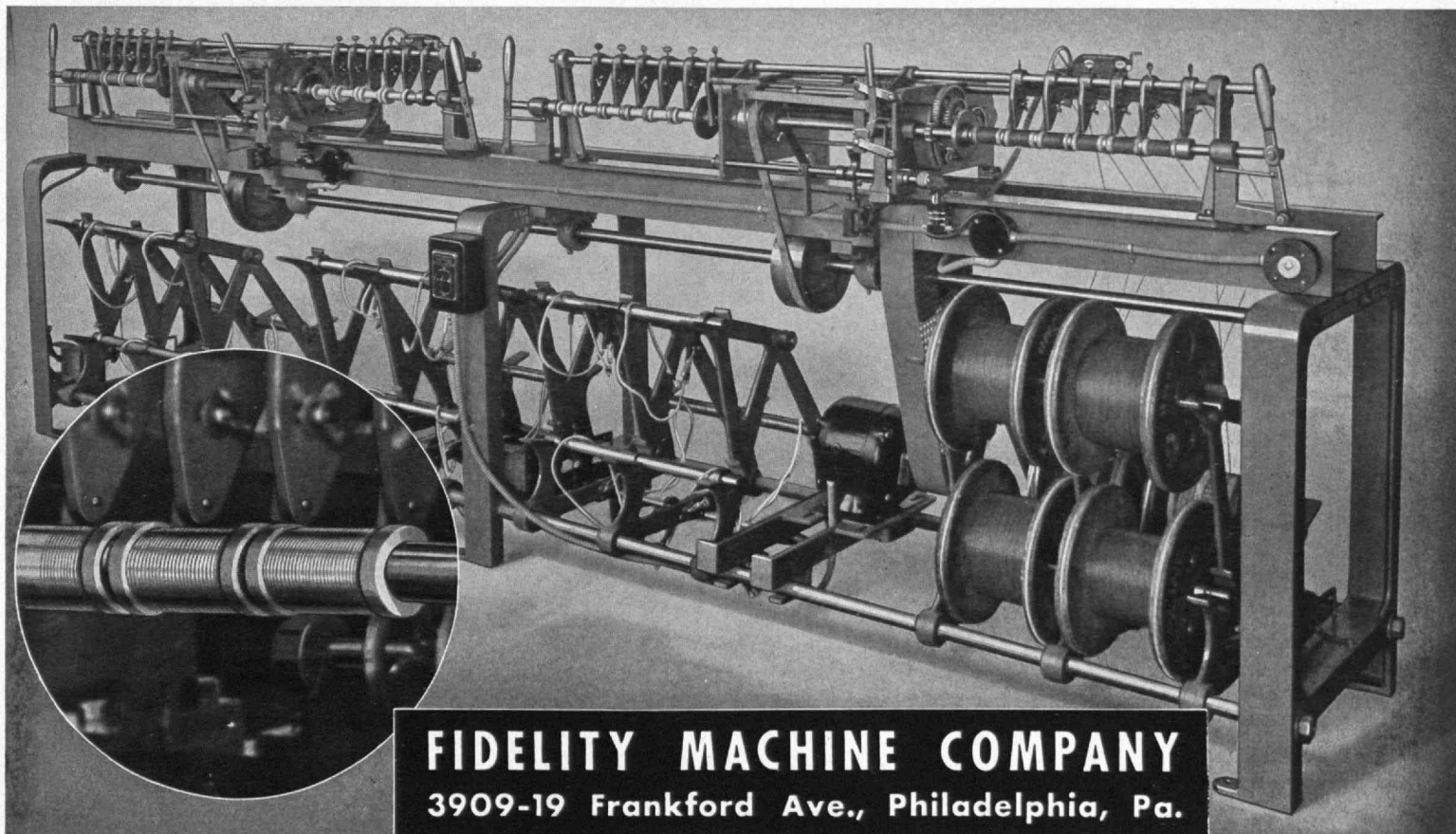
## **FIDELITY Wire Spooling Machines** ---from Reels or Coils ---to Sticks or Spools

Precision winding at high speed, with unvarying weight and even lay of wire on spool or stick—these are outstanding advantages of FIDELITY Wire Spooling Machines. They are quickly adjusted to required length, thickness or spacing—simple to operate, minimum labor attention and low horsepower.

*Write for illustrated folder describing four types of standard machines and operating specifications.*

*Above:* FIDELITY Spooling Machine with new hydraulic control to wind wire on flat or square sticks from brake-controlled reels.

*Below:* FIDELITY Screw Traverse Machine winds wire on conventional type wooden or metallic spools.



**FIDELITY MACHINE COMPANY**  
 3909-19 Frankford Ave., Philadelphia, Pa.



## THE POSTGRADUATE AND HIS WORLD

(Continued from page 446)

with these three categories taken into consideration, this particular field still has to meet a substantial deficit of trained man power over the next two years.

Similar studies are being undertaken in the other strategic fields, and out of this whole program will come a national policy for the selective training and induction of professional personnel in the fields of current greatest strategic importance. It is unfortunate but probably inevitable that this intensive training could not have been started earlier so that the educational program could have been geared in advance to meet the needs. We know that Germany, systematically planning her aggressive program for years, had undertaken such an educational project even down to the secondary school level.

The United States is definitely immersed in this war era, and the only thing which we can do is to operate as efficiently as possible along such lines as those I have just described. Our success in this war may very possibly depend in a large degree on the wisdom and efficiency with which the professional man power of this country is handled and trained.

But what about the possibilities in the postwar era? Unless our national affairs are very badly mishandled, everything seems to me to point to an unprecedented era of opportunity for men trained in the technological

professions. A few illustrations should make this clear. We know that there is normally an annual demand for the building of homes and larger structures to meet the new population needs and to replace buildings which have become obsolescent. During the war, work on this type of building is practically stopped. We are consequently building up month by month a deficit in all aspects of building construction. At the close of the war, this great deficit will provide one of the obvious opportunities for industrial and professional activity; in terms of the amount of business and of man power required, this is a huge and increasing reservoir for the future. Similarly, in the enormous and varied fields of mechanical equipment, production of all types of necessities and luxuries is being stopped or greatly curtailed during the war period. This category includes automobiles, electric refrigerators and other household equipment, radios, and all similar objects which we can get along without for a period of emergency but which people are willing to pay and work for when the supply again becomes accessible.

In these two categories we have a so-called shelf of industrial employment which can quickly be called upon at the end of the war and which can provide the basis of activity for a number of years while we catch up with what would have been normal production of these items had not the war intervened.

While such factors can, if properly handled, serve to offset the danger of a depression following the war and

(Continued on page 464)

### *To Young Engineers Who Have Moved Up Front*

YOUR CHIEF is a busy man these days. New Plans — New Plants — Trips to Washington — Conferences — Priorities. His years of experience, that made tough jobs easy, are now needed for the tougher jobs that add up to winning the war.

Yours is the job of getting things done. The engineering for plant expansion and conversion is your responsibility. Your problems are many. Among them are the

special applications of psychrometrics — temperatures, humidities, atmospheric pressures. You may have to set up sub-stratospheric tests and low temperature research equipment. Perhaps you will need oil cooling, rivet cooling, or refrigeration. You might require the air conditioning and ventilation of blackout plants, gauge rooms or assembly rooms.

*The years of experience of the men of our organization are available to you, just as they were to the Chief. Tell us what you need, and, by combining ingenuity with engineering, we shall see that you get it.*

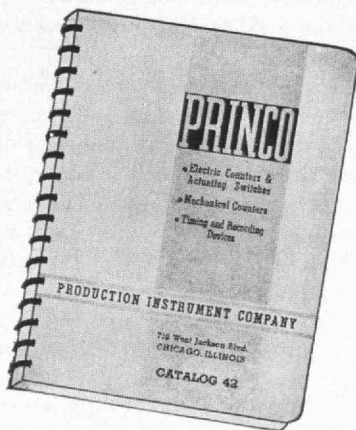
**HAROLD J. RYAN, INC.,** *Air Conditioning*

122 East 42nd Street, New York City

# Wizard Electric Counters



Wizard Electric Counters are available for any voltage up to 220 in either alternating or direct current.



Write for Catalog 42 describing our complete line of Counting, Timing and Recording Devices.

The Wizard Electric Counter was designed to meet the requirements of long, trouble-free service in counting production.

Because of its correct design, mechanically and electrically, it has also been able to meet some very unusual operating requirements. The mention of a few will give an idea of its versatility:

- A. It has been installed where it must operate up to 2000 counts per minute.
- B. It will operate up to 720 counts from the discharge of a 1 MF Condenser (Condenser being charged between counts).
- C. It will operate directly from the plate circuit of an electronic tube drawing approximately 20 milamps. Control of grid may be by light, by sound, or through miniature contacts.
- D. Properly installed it will operate on as little as 21½ Watts at 600 counts per minute. Higher speeds require more energy.

## Production Instrument Company

716 W. JACKSON BOULEVARD CHICAGO, ILLINOIS

MANUFACTURERS OF

• Mechanical Counters • Electric Counters • Predetermined Electric Counters • Folding Machine Counters • Coil Winding Counters • Signal-Graph (Timing and Recording Devices) • Time Totalizers • Counter Actuating Switches



## THE POSTGRADUATE AND HIS WORLD

(Continued from page 462)

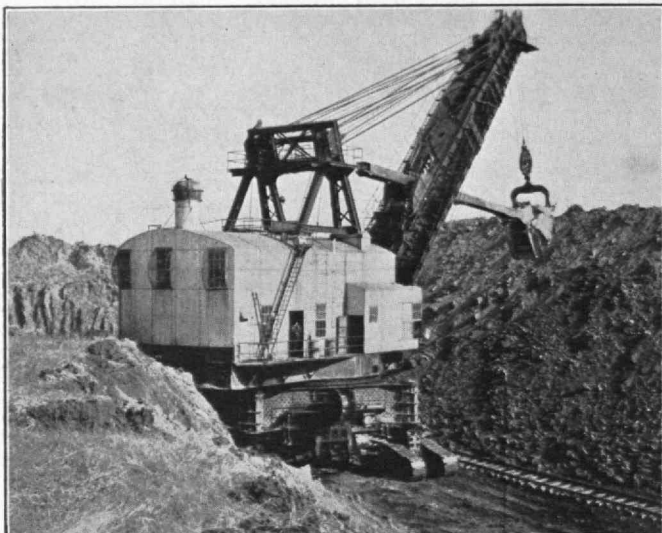
to reverse the present downward trend in living standards, nevertheless this type of reservoir in itself is not enough to form the basis of a permanent national prosperity. Added to these things must also be a continual succession of new technological developments which will lay the basis for improved types of industry and provide our people with materials and services to enhance safety, comfort, health, and enjoyment.

Just what these things will be will depend upon the research scientist and the development engineer; most of them cannot be foreseen long in advance. All we can say is that past experience proves that such things do continually emerge from the active work of technically trained men operating under conditions which give a reasonable incentive. I think that among the new developments now in sight will be included a greatly expanded system of air transportation and a large production and use of materials such as plastics, textiles, alloys, and synthetic replacements for naturally occurring materials previously used. It looks also as if the food industry would see important advances arising from the very rapid progress in the science of nutrition, on the one hand, and the science of food processing, on the other. Many signs indicate that some of the serious problems of overproduction in agriculture will be solved or at least mitigated by the continued development of industrial uses for farm products. From the intensive research now being devoted to war purposes, it is already evident that a number of very valuable peacetime applications will be made which can well be expected to form the basis of substantial industrial and professional activity.

These factors are all fundamental and are inherent in the present situation. As I have said, however, the degree to which a prosperous era can be based upon them will depend upon the success with which other factors can be handled. Obviously the first and most important of these conditioning factors is our success in winning the war. If we should lose, the vista of postwar prosperity disappears. Thus a long-time as well as a short-time emergency dictates the necessity for us to devote every possible effort and sacrifice for the winning of the war.

A second essential for postwar prosperity will be the existence, after the war, of a condition that provides the encouragement and the incentives without which neither a manufacturing concern or business organization nor a professional engineer or research worker can operate with effectiveness. A deterrent obviously will be found in heavy taxation. I am convinced, however, that this need not prevent postwar prosperity provided the taxation is handled in such a manner as to give individuals and organizations a real incentive for taking the risks and investing the funds and the energies necessary to get new enterprises under way. It is certainly possible to devise heavy taxation which still leaves incentives for investment in future enterprises. Provisions of this type would be about the wisest things which Congress could establish in future tax legislation.

(Concluded on page 466)



### TIREX CABLE

because it is both tough and dependable  
was used for this shovel

Simplex Wire & Cable Co.  
79 Sidney St., Cambridge, Mass.



Reg. U. S. Pat. Off.

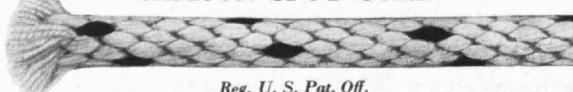
### Samson Cordage Works

Boston, Mass.

Herbert G. Pratt, '85, Chairman of the Board

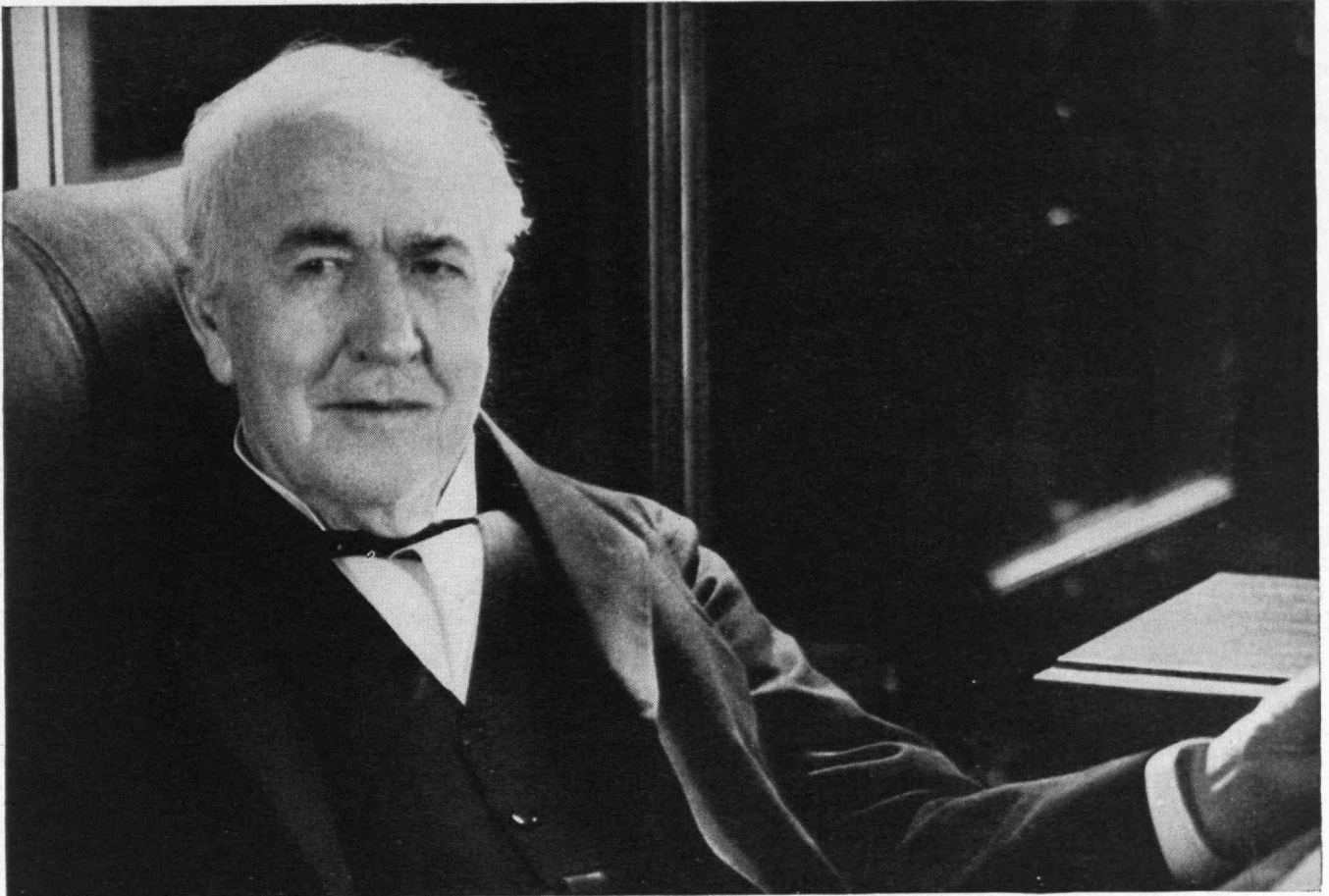
Manufacturers of braided cords of all kinds, including sash cord, clothes line, trolley cord, signal cord, shade cord, Venetian blind cord, awning line, etc., also polished cotton twines, ladder tape for Venetian blinds, and specialties.

#### SAMSON SPOT CORD



Reg. U. S. Pat. Off.

Our extra quality sash cord, distinguished at a glance by our trade-mark, the colored spots. Especially well known as the most durable material for hanging windows, for which use it has been specified by architects for nearly half a century.



## PROGRESS *has its* *roots in* TRADITION

This man founded our company. You'll find portraits like this all through our plants...in the offices of executives...near the desks of production men...in the laboratories of our engineers.

It's more than "a picture of the boss." It's a challenge to the men he left to carry on his work.

To tell precisely what we are doing to help America win this war is against military interests. But we *can* say that never has our task been so great, nor the achieve-

ment so gratifying. All divisions are carrying on Thomas Alva Edison's own charge: "I trust you for progress."

Ediphones . . . Edison Steel-Alkaline Batteries . . . Edison Primary Batteries . . . Edison Starting, Lighting and Ignition Batteries . . . Edison Spark Plugs and Magnetos . . . Edison Miners' Cap Lamps . . . Medical Gases . . . Instruments . . . Wood Products . . . Special Manufactures.

*Thomas A Edison*  
INCORPORATED

WEST ORANGE • NEW JERSEY



## THE POSTGRADUATE AND HIS WORLD

(Concluded from page 464)

As we view the future, I believe that one factor of encouragement is to be found in the stern requirements for leadership which the present crisis in national affairs demands. If we come through this crisis successfully, we shall do so because our leadership has been sifted and trained to operate far more effectively than it has usually done under the easy requirements of peacetime. The political leaders and the businessmen who have been emerging successfully in this war effort should be men of caliber who can be trusted to continue this leadership as we enter the postwar era. Consequently, in the near future perhaps the most important thing for the American people to do in anticipation of the more distant future is to insure that they elect men to positions of political leadership on the basis of wisdom and ability and not on the basis of partisan politics or *laissez faire*.

So, as you leave this period of professional training to enter first into the activities of a country at war and later into the reconstruction activities of a country at peace, I believe that the outlook is on the whole decidedly encouraging. I can think of no professional group which should be in a better position to render important national service and at the same time secure appropriate recognition in terms of opportunity to earn a good living than the group trained in those professions based upon science and its applications. I believe that the opportunities are definitely in sight. It is the job of every one of us to exert all possible effort to insure that outcome. It is with this note of encouragement and of exhortation that I conclude my address to you as professionally trained men and women leaving the Institute with advanced degrees from its Graduate School.

## WHO IS THE RESEARCH MAN?

(Continued from page 452)

contained in the excellent statement of H. D. Arnold, who was director of research in the Bell Telephone Laboratories. After pointing out that "research is in its very essence individualistic" and that one must not fall into the very common confusion which fails to distinguish clearly between research itself and the tools which it uses, Dr. Arnold said:

Research is of the mind and not of the hands, a concentration of thought and not a process of experimentation. We all know too well the common picture of the research worker — a microscope, a retort, a balance, a measure, and a man in an apron. It depicts, it is true, something of the delicacy of the apparatus required, and suggests the skill and the patience necessary for its manipulation. It fails, however, to represent Research itself, which is as apt in the use of crude apparatus as in the use of delicate apparatus; whose special pride, indeed, is to bend the simplest tools to new uses, and whose real interest is not in the skill of the performer, but in the meaning of the performance. Research is not constructing and manipulating; it is not observing and accumulating data; it is not merely investigating or experimenting; it is not "get-

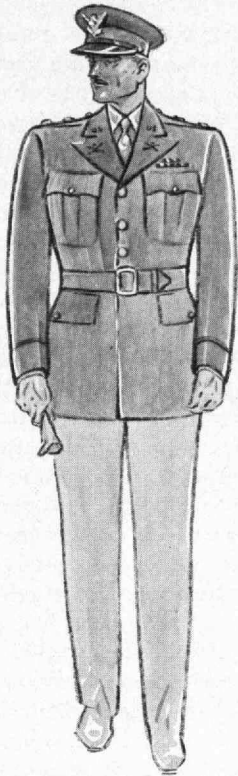
ting the facts"; although each of these activities may play an indispensable part in it. Research is the effort of the mind to comprehend relationships which no one has previously known. And in its finest exemplifications it is practical as well as theoretical; trending always toward worth-while relationships; demanding common sense as well as uncommon ability.

That concept of research should be accepted no matter if many of the conventional statements have to be disregarded. Even so excellent a report as that on research as a national resource fails to emphasize the importance of attitude, and mentions as required qualities for research work several that would apply more aptly in other types of work. It lists intellectual integrity, scientific curiosity, creative urge, imagination, and ingenuity; but it also lists ability to co-operate, judgment, and personality, which are general requirements for success in any group activity. The report stresses likewise the ability to decide correctly in favor of "subordination versus assumption of responsibility" — in other words, when to go ahead on one's own judgment and when to seek first the instructions of a superior; also emphasized are leadership, execution, ability to write and present reports, ability to complete work as well as to start something — all requirements for success in large organizations.

The difficulty arises from the failure to follow Dr. Arnold's dictum not to confuse research with the tools it uses. Nor should similarities in education and training be allowed to confuse. There are many with master's and doctor's degrees who never did a piece of research after they left their college halls, and there are engineering night-school graduates who have done excellent research. The confusion arises because many in authoritative positions seem to think that any "fact finding" is research and, since measurement is essential to the development of knowledge, that measuring and testing are research. Many a testing laboratory is wrongly named a research laboratory despite the fact, mentioned earlier, that research laboratories grew out of testing laboratories. Though they both sometimes used the same instruments, the research laboratories evolved because of the attitudes of mind of some of their workers.

Engineering, designing, inventing, experimentally developing, measuring, counting, and testing are all importantly necessary operations in our technical advancement. They deserve no whit less credit than does research, but they are not research. Put a man with the attitude of mind of an engineer or of an inventor at the head of a laboratory, and unless he can change his psychological make-up the laboratory will not be one of research while he is dominant. Let a research laboratory once get the idea that testing is research and, as far as advancing fundamental knowledge is concerned, it's got dry rot at its roots. Progress, of course, requires all these different types of work and the co-ordination of them. In industrial laboratories sometimes they go along side by side. Hence this effort to distinguish between research and its concomitants in large-scale enterprise may appear relatively unimportant and even pedantic. It is not! If, as a society, we need for our engineering developments a rapidly extended base of scientific knowledge, we can get it only by research. If

(Continued on page 468)



© Brooks Brothers

Paul Brown

ESTABLISHED 1818

*Brooks Brothers,*

**CLOTHING,**

**Mens Furnishings, Hats & Shoes**

**MADISON AVENUE COR. FORTY-FOURTH STREET  
NEW YORK**

READY-MADE UNIFORMS FOR  
OFFICERS IN THE SERVICE OF  
THE UNITED STATES

Army Officer's Uniform, \$66  
Overcoat, \$85  
Naval Officer's Uniform, \$55  
Bridge Coat, \$78      Raincoat, \$55  
Naval Aviators' Uniforms, \$72  
(Insignia of Rank and Branch Extra)  
*Send for BROOKS-Illustrated  
and Army & Navy Illustrated Price List*

**BRANCHES**  
**NEW YORK: ONE WALL STREET**  
**BOSTON: NEWBURY COR. BERKELEY STREET**



Paul Brown

© Brooks Brothers

## MASSACHUSETTS INSTITUTE OF TECHNOLOGY

*Cambridge, Massachusetts*

**T**HE schools of Architecture, Engineering and Science, the Graduate School and the Division of Humanities offer instruction and opportunities for research, both undergraduate and graduate, in the following fields of study as well as in allied subjects:

### SCHOOL OF ARCHITECTURE

Architecture  
City Planning  
City Planning Practice

### SCHOOL OF SCIENCE

Biology and Public Health  
Chemistry  
General Science  
Geology  
Mathematics  
Physics

### SCHOOL OF ENGINEERING

Aeronautical Engineering  
Building Engineering and Construction  
Business and Engineering Administration  
Chemical Engineering  
Civil and Sanitary Engineering  
Electrical Engineering  
General Engineering  
Marine Transportation  
Mechanical Engineering  
Metallurgy  
Naval Architecture and Marine Engineering

The Catalogue contains full information and will be sent gratis and post free upon request. All correspondence regarding admission either to undergraduate or graduate study should be addressed to the Director of Admissions, M.I.T., Cambridge, Mass.



## BLUEPRINTS VS. BOTTLENECKS

Don't allow delay in receiving blueprints to hold up production.

Such hold-ups stymie your efforts as much as delayed materials.

ELECTRO SUN SERVICE means you receive prints on time.

Also, we have a complete plant for **PHOTO PRINTS** and **OFFSET PRINTING**—all under one roof.

**WE'LL HELP KEEP 'EM ROLLING AND FLYING**

**ELECTRO SUN CO., INC. NEW YORK, N.Y.**

PHOTO LITHOGRAPHS • BLUEPRINTS • PHOTO COPIES • LITHOGRAPHS  
161 WASHINGTON STREET GRAND CENTRAL TERMINAL BLDG.  
BARCLAY 7-2334 MURRAY HILL 6-6526

## THE RUMFORD PRESS

CONCORD  
NEW HAMPSHIRE

WHERE PRINTING IS  
STILL A **CRAFT**

## WHO IS THE RESEARCH MAN?

(Continued from page 466)

people delude themselves or for commercial publicity flatter themselves by claiming they are doing research when they are merely developing applications of existing knowledge, the stream of progress can be corked at its source. The function of research is to clear out the spring and to open new sources. By all means, let applications and utilizations continue to be made; but for the long view, let more and more of the research-minded be selected, trained, and employed.

The popular confusion as to just what is research and who is a research man results, in part, from two causes: one essentially biological, and the other sociological, in the sense that it inheres in organized human relations. Though the idea may be unpleasant to many of us, the fact seems to be that research accomplishment is usually a function of youth or early maturity. Life does not begin at 40 if it is in research. By that age most workers are approaching or are even past their years of greatest individual productivity. Their important discoveries have been made, and the creative spark is much less bright although shrouded in a background of wide experience and more mature judgment. The worker has reached a stage when he might serve best as adviser and appraiser, as an executive to decide which jobs to push and which juniors to assign to them. It is these juniors, however, who usually perceive the new phenomena, report theories about them, and ask for time, assistants, and facilities to develop them.

The time curve for the rise and fall of creative accomplishment is, of course, individual and is varied by many stimuli. Usually the decline from the peak is so gradual as to escape casual notice. New ideas may occur, but may do so less exuberantly. Or the worker may expend greater effort on the extensions and elaborations of his earlier discoveries—more time in nurture and less in pregnancy. Sometimes he may even get an ancestral credit for the offspring of others. All of these observations are made without stigma; essentially the phenomenon is a familiar biological one. On every frontier, including that of science, youth fights the wars.

To deplore this fact is as useless as to deny it. We should, however, deplore the tendency to divert men of research talent into other lines of activity, as into the executive control of research. Executive control usually means responsibility for decisions as to number of dollars to spend, number of men to employ, and what men to assign to what responsibilities. Such work naturally is best done by one with a research background, but it is a question whether in the long run society gains or loses when a great scientist spends time on the organizational responsibilities of a great school. Similar instances are provided in industrial research. Only an omniscient dictator could efficiently apportion the effort of men, keep them at research until their declining output just balanced in social value their executive judgment, and then make the transfer.

This fact—that for group accomplishment, human beings associate in organizations which must have leaders and controllers—accounts for much of the current confusion regarding the characteristics desirable

in research workers. That is why the ability to co-operate is so high in the list of requirements for research men given in the report of the National Research Council's committee, and the ability to write a good report is stressed because upon that will be based executive decisions as to the continuing, dropping, or expanding of experimental work. The emphasis on report writing has the wrong reason back of it; to say that clear expression arises from clear thinking would justify a place for it in the list. Similarly the emphasis on so-called leadership and on supervisory ability is a far cry from research.

The situation is usually this: A worker makes progress on a research project which proves to be important, and, therefore, more workers are assigned to it, to report to him as the most experienced. He is pushed up the hierarchic line like a mass of hot air meeting an arctic cold front. He is automatically made a minor and then an intermediate executive; hence the emphasis on so-called executive ability. Though this diversion of his attention may decrease his own scientific output, that's the risk taken by the organization and by the society of which it is a part.

More can and should be done to guarantee that society does not waste the potentials of its research-minded men. The manner of selecting this type should be improved over our present haphazard method. No genius of the future should escape the educational net. And after he is trained, the opportunities and rewards for research should somehow be made sufficient to insure that his output will reach the maximum.

## THE TREND OF AFFAIRS

(Continued from page 440)

time when treated wood is being called upon increasingly. Synthetic rubber's contribution was entirely accidental: During World War I, two Austrian chemists, trying to find a satisfactory substitute for natural rubber, inadvertently included several wood blocks in a batch being cooked at high pressures and temperatures. Though there is no record of the success of the cook, the wood blocks came out not crushed to shreds but compressed to a hard, dense mass. Further experimentation demonstrated that, given sufficiently high temperatures, dry wood could be compressed, with no sign of rupture, to a dense board two to three times as heavy as the original material and as many times as strong. The new product, "lignostone," promptly found a number of uses for which hardness, density, and strength were needed.

With the spectacular advent of the plastics, the prediction was freely made that wood might soon disappear from a great many of its traditional uses and that the synthetic materials would take over completely. Some of the synthetic resins, however, were soon discovered to be superior adhesives, with the result that wood, far from being supplanted, could be used for many purposes formerly denied it. Waterproof plywood and laminated parts of all kinds, using moistureproof and moldproof resin adhesives, have multiplied its usefulness.

(Continued on page 470)



## Hevi Duty Electric Co. Electric Furnaces MILWAUKEE, WISCONSIN

Hevi Duty Precision Electric Heat Treating Furnaces are built in a large variety of types and sizes — for many heat treating operations — with temperature ranges to 2500° F. (1371° C.). They are standard production equipment in many national industrial plants.

Write for descriptive bulletins

GEORGE A. CHUTTER, '21  
District Manager  
90 West Broadway  
New York

ELTON E. STAPLES, '26  
District Manager  
205 W. Wacker Drive  
Chicago, Ill.

## "NOTES ON PRODUCTION"

. . . containing 23 sections covering subjects of vital interest and importance to Production Men Everywhere.

This book is the outcome of discussions of current factory problems which have appeared in *Factory Management and Maintenance* over a period of seven years. Written by authorities out of practical industrial experience.

9" x 12" — 360 pages ■ Over 200 illustrations

SENT ON 10 DAYS' APPROVAL

Price \$3.50

ADDISON-WESLEY PRESS, INC.

Kendall Square Building  
Cambridge Massachusetts



## THE TREND OF AFFAIRS

(Continued from page 469)

Heat is necessary for curing the best of the resin adhesives. Many are used in the liquid form and consequently soak into dry wood. Experimenters have discovered that the resin-soaked material becomes considerably softer and more pliable at high curing temperatures, that it can be molded rather readily, and that under moderate pressure it will compress to a hard, dense, glossy, resin-impregnated mass.

Further experimentation with the new compressed material has revealed that the species of wood employed and, to a large degree, its quality have little effect upon the final strength if the wood is compressed to a certain density. Birch, gum, tupelo, yellow poplar, spruce, and fir, which vary widely in the natural state, yield in general the same strength and hardness when compressed to the same specific gravity. Mechanical properties, therefore, can be largely controlled provided wood is merely pressed to a predetermined density, and inexpensive species may be employed as well as the costly types of superior grade. At high pressures the resin-impregnated wood becomes absolutely dense, that is, all pores close up and actual "solid" wood results. High-density, homogeneous material of this kind has a weight-to-strength ratio which compares favorably with that of duralumin.

By careful impregnation, the resin can be made to fill the fine internal structure of the cell walls of the wood and, when cured, will prevent shrinking and swelling even under exposure to the most severe conditions. Plastics, consequently, have given us a method of controlling the two heretofore uncontrollable variables of wood — its strength and dimensional stability.

### Fluid Flames

UPON the radiating and burning characteristics of flames depend many operating economies in industrial activity. The design of furnaces must consider not only the minimization of losses in the form of unburned combustible matter in the stack gases but the correction of temperature distribution as well; for the objective of all furnaces is the transfer of energy through a surface. Frequently this transfer must be tailored to a very definite pattern, and the furnace engineer is consequently interested in how the combustion process affects flame shape. As part of the long-range investigation of industrial-furnace design which has been carried on at Technology, a study of the relation of combustion to flame shape is being made and has already led to conclusions which are of direct usefulness.

In all gas flames, the air for combustion either is mixed with the cold gas before its ignition or is supplied as secondary air after ignition and mixes with the gas during the burning process. The flame burning in secondary air is perhaps the more common of the two types. Important, if not the controlling factor, in the process of combustion of such flames is the mixing of the gas and air. Hence studies of fluid flow and of mixing are

of primary importance in the investigation of flames. Depending on the velocity of gas flow, flames of gas burning in secondary air are of two kinds: diffusion flames, in which the flow is laminar and steady; and turbulent flames, in which the flow is turbulent and the flame is unsteady in appearance.

The growth of the first type of flame and its evolution into flame of the second type are readily observed. When a jet of gas is lighted and the pressure differential is gradually increased from zero, the length of the flame is roughly proportional to the velocity of the gas flowing from the port. The flame is sharply bounded, daggerlike in appearance, and up to fifty diameters in length. If the room is still, the flame looks like a solid object. The mixing process in a flame of this sort is the molecular diffusion of oxygen from the surrounding air and fuel gas from the core of the flame which meet at the flame surface.

Now if the port velocity of the fuel is further increased, a new phenomenon occurs. Little curls develop at the tip of the flame, showing that instability is arising. With greater port velocity, the point on the flame where the curls start moves down toward the port, and the part of the flame above this "break point" is altogether different from the sharply bounded diffusion flame which has been described. As the velocity of the fuel increases further, the bushy portion of the flame lengthens and the stemlike portion below the break point shortens until ultimately the entire flame is a noisy, roaring, bushlike mass of curls and swirls. This is turbulent flame, the product of turbulent mixing, the energy for which is supplied by the kinetic energy of the gas jet. Though at first the length of the flame is a function of the port velocity, a critical point is reached beyond which flame length becomes substantially independent of velocity, even up to the speed of sound.

The problems of combustion and gas flow in industrial furnaces are very difficult of approach, for in such furnaces the gas flow is extremely complicated. Hence at the Institute recourse has been had to models of flames. These are produced by a dilute alkaline water jet (corresponding to the fuel gas) discharging through a port into a dilute acid solution (corresponding to the ambient air). The alkaline jet carries a red dye. The color disappears as mixing occurs between the jet and the surrounding solution. A luminous gas jet burning in air produces flames of certain shapes and eddies. The alkaline jet discharging into acid produces flamelike shapes which in area, outline, and surface characteristics closely resemble the flames of burning gas. Similarly, the length of the "fluid flame" is a function of port velocity up to a critical point; the beginning of turbulence is marked by the appearance of curls at the tip of the flame; the break point moves downward as port velocity is increased; the fluid flame ultimately becomes entirely a bushlike turbulent mass. Hence the models offer a ready means of studying conditions designed to provide the best mixing of fuel and air.

Turbulent mixing is sought when a high rate of thermal output to each unit of furnace volume is desired. A slow, nonturbulent flame is sought when, as in rotary kilns, a comparatively large area must receive relatively uniform heat. The fluid models, since they indicate

rates of flow which will provide flames of desired characteristics, are looked upon as promising much in the way of assistance in furnace design. Study toward this end is continuing in the Department of Chemical Engineering at Technology under the direction of Hoyt C. Hottel, '24, Professor of Fuel Engineering and Director of the Fuels Research Laboratories.

### *Looking through New England Glass*

**I**N the last quarter of the Nineteenth Century, as two recent articles in *The Review* have indicated, the economic pendulum of the glass industry swung away from New England toward the Middle West. The Berkshire and Cheshire sand beds in western Massachusetts, the silica of Lantern Hill in North Stonington, Conn., and the imported foreign sand (before high tariffs were laid on it, foreign sand shipped in as ballast cost next to nothing) had satisfactorily supplied New England glass factories during the first three-quarters of the Nineteenth Century. In fact, all of the usual ingredients of glass except soda ash occur in New England. The discovery of new and suitable deposits of sand in the Middle West, coupled with the opening of rich sources of both coal and natural gas in that same area, was required to cause the glass industry to move west.

Evidence is accumulating, however, which points toward at least a partial renaissance of the industry in New England. Now the fuel problem has been alleviated. In the Nineteenth Century, coal was practically the only available fuel, and the cost of transporting it to New England was great. But today, oil is becoming the greatest source of fuel, and the cost of shipping it to tidewater points in New England is not, in normal times, prohibitive.

Since the price of fuel is no longer a stumbling block, native sand and silica can again be used. The Berkshire and Cheshire beds are too far from tidewater ports, are unworkable during severe winter months, are distant from markets, and are lacking a near-by supply of labor. But Lantern Hill silica, once used in the famous Sandwich glass, lies near Mystic, Conn., a good tidewater port. This hill, about 300 feet high and two-thirds of a mile long, is almost solid silica of a good grade. The deposits of silica in Pennsylvania and Illinois have the advantage that they exist as sand and hence need only to be washed and screened, whereas the silica of Lantern Hill requires considerable processing. Yet the cost of this processing is less than that of transporting finished products from the Middle West.

On the assumption, then, that a glass factory in New England could compete successfully with Midwestern factories in their two major requirements — sand and fuel — the next consideration is markets. A circle with a radius of 100 miles, drawn with Mystic, Conn., as its center, would include most of the densely populated districts of New England — Rhode Island, Boston and vicinity, and the inland and coastal cities of Connecticut. New York City is not too far beyond. This section has many uses for glass of all kinds. Whatever extra amount New England glass factories would have to pay for transporting fuel to this area would be saved in transportation costs on finished products, which now

(Continued on page 472)



## WILLIAM D. NEUBERG COMPANY

*Chemicals*

GRAYBAR BUILDING • 420 LEXINGTON AVE.

NEW YORK, N. Y.

TELEPHONE LEXINGTON 2-3324



<b>"K-A"</b> <small>TRADE MARK REG. U. S. PAT. OFF.</small>	<b>CHUTE CLOTH</b> <b>BLANKETS</b> <b>DUCK</b>	<b>FLARE CLOTH</b> <b>DENIMS</b> <b>TAPES</b>
<b>"DOES ITS BIT"</b> <small>HELPING WEAVE MORE AND BETTER</small>	<b>DRILLS TWILLS</b> <b>UNIFORM CLOTH</b>	
<b>VICTORY FABRICS</b> <b>R. I. Warp Stop Equipment Co.</b> <small>PAWTUCKET, R. I.</small>		



# PRINTING

( LETTERPRESS  
AND OFFSET )

## THE MURRAY PRINTING COMPANY

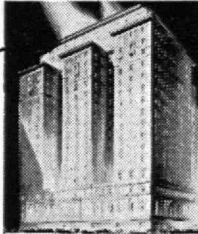
18 AMES STREET, CAMBRIDGE



AT YOUR

Elbow

At The Roosevelt everything that makes New York so interesting is right at your elbow. Step off your train at Grand Central, follow the private passageway direct to The Roosevelt, enjoy friendlier service . . . cheerful, spacious rooms . . . delicious food . . . and a restful atmosphere that have endeared The Roosevelt to its guests year after year. Attractive rooms with bath from \$4.50.



**WALTER PERNER**  
and His Orchestra  
in the  
**ROOSEVELT GRILL**  
Nightly except  
Sundays

**HOTEL  
ROOSEVELT**

MADISON AVE. AT 45th ST., NEW YORK

BERNAM G. HINES, Managing Director



Transits and Levels are used on all largest works and by U.S. Govt. for utmost precision. Rental Insts. New catalog, just issued, sent gratis. A souvenir plumb-bob sent for 3¢ postage.

**BUFF & BUFF CO.** Boston 30, Mass.

Henry A. Buff '05

## THE TREND OF AFFAIRS

(Continued from page 471)

must be shipped from the Middle West or New Jersey. At present, New England has only a very few plants, and they produce glass for special purposes, as, for example, the American Thermos Bottle Company in Norwich, Conn. This company and others have determined that Lantern Hill silica is suitable for a high-grade glass. Further experiments are being conducted.

This preliminary effort to revive the glass industry in New England has been fostered by the New England Industrial Research Foundation, which has spent much time in estimating possible markets, in computing transportation costs of raw ingredients and finished products, and in aiding and instigating the search for suitable deposits of native materials. Professor Frederick H. Norton, '18, Professor Frederick K. Morris, and Professor Antoine M. Gaudin have conducted test experiments at Technology and, together with Professor George W. Bain of Amherst, have offered valuable suggestions on technical aspects. Time and effort were donated by these men as a service of good citizenship to help improve New England industry.

### Oil and Oxygen

FAMILIAR to everyone are the electrical transmission lines crisscrossing the continent, the tall towers of high-voltage lines marching uniformly to the horizon, the poles of lower-tension lines parading with less majesty but no less efficiency. Not at all so well known, however, are the thousands on thousands of miles of underground cable buried beneath the surface in urban areas and now more and more being used to link distant regions.

Once a cable is to be placed underground, new problems not present in overhead lines confront the electrical engineer. Below ground, cable spacings must be small — an inch or less at 100,000 volts as compared with 10 feet for the same voltage in aerial lines. Moreover, oil-impregnated paper is the only practical in-

## PREPARATORY SCHOOLS FOR BOYS

### BERKELEY PREPARATORY SCHOOL

*Established 1907*

Special preparatory courses for M.I.T.

Day School — Summer Session — Co-Educational

Accredited by N.E. College Entrance Certificate Board

HARRY F. CADE, JR., '28, Headmaster

470 Commonwealth Ave., Boston Send for Catalog "T" Tel. COM 3777

### CHAUNCY HALL SCHOOL

Founded 1828. The School that confines itself exclusively to the preparation of students for the Massachusetts Institute of Technology.

FRANKLIN T. KURT, Principal

553 Boylston Street, Boston, Mass.

### HEBRON ACADEMY

Thorough college preparation for boys at moderate cost. 83 Hebron boys enrolled in 33 colleges this year. Excellent winter sports facilities. Ski trails, ski camps. Covered skating rink. Experienced winter sports coach.

*For catalogue and illustrated booklet address*

RALPH L. HUNT, Principal

Box T, Hebron, Maine

### HUNTINGTON SCHOOL FOR BOYS

Five Forms. Special two-year course for entrance to M.I.T.

Summer Session (Co-educational)

Send for catalogues

CHARLES H. SAMPSON, Ed.M., Headmaster

320 Huntington Ave., Boston

Tel. Kenmore 1800

insulating material for underground use. Upon it much depends, for if deterioration occurs, losses as high as 25 to 50 per cent of the normal rating of the circuit may result.

Principal foe of the mineral oils used in electrical insulation is oxygen, since the oxidation of such oils results in the formation of water and various acids, and leads to losses in the insulating abilities of the oil. Paradoxically enough, however, if the oil has a chance to soak up unlimited amounts of oxygen, it does not degenerate so badly as when the oxygen supply is present but limited. Under conditions of limited oxidation, with a restricted amount of oxygen available to the oil, dielectric losses are encountered which are 10 to 100 times as great as those for oil under continuous oxidation, with unlimited oxygen available.

This idiosyncrasy of oils is among the subjects under study in the long-range program of investigation of insulating oils and cable saturants directed by Jayson C. Balsbaugh, '24, Associate Professor of Electric Power Production and Distribution at the Institute, under the sponsorship of the Engineering Foundation and of the American Institute of Electrical Engineers, with the support of a large number of industrial organizations. Last surveyed in The Review for November, 1940, Professor Balsbaugh's work has been steadily progressing, with the design and construction of further delicate instruments and apparatus for exposing oils to oxidation under controlled conditions, and for measuring the extremely minute differences in dielectric characteristics which result. The reliance of the electrical industry upon insulating oils for transformers and other apparatus — as well as upon oil-impregnated paper for cables — makes the program of fundamental importance. This importance is emphasized by wartime needs for the economical utilization of materials.

Increases in dielectric loss in cables during service which are not explainable by conventional tests may be explained by the much greater changes found in the limited oxidation tests, for these appear to reproduce pretty closely the conditions present in oil-paper cables and in transformers with a limited amount of air. Under conditions of limited oxidation, the Technology group has found, copper or lead in contact with the oil is required to give the high losses, and the losses are somewhat proportional to the amount of metal present.



## PEQUOT SHEETS

With those convenient little size tabs that tell you the correct sheet for each type bed right from the linen shelf.

## PEQUOT MILLS

Salem, Mass.

HENRY P. BENSON  
President

— Class '86

## — STEEL —

HOT AND COLD ROLLED  
DEFORMED BARS FOR CONCRETE

# Stahleker Steel Corp.

Second and Binney Sts., Kendall Sq., Cambridge, Mass.

Telephone Trowbridge 1440

WALLACE BLANCHARD, '16, Treasurer

# McCREERY and THERIAULT

## *Building Construction*

131 CLARENDON STREET

BOSTON, MASS.



## HANDBOOK OF COLORIMETRY

By the Staff of the Color Measurement Laboratory of M.I.T.

(EDITED BY PROFESSOR ARTHUR C. HARDY)

THIS HANDBOOK discusses the characteristics of light sources, the physical measurement of colored materials, and the laws of color mixture. It includes the recommendations of the International Commission on illumination which are interpolated to wave-length intervals of one millimicron; and in addition many auxiliary tables and charts which facilitate the specification of color. The large page size (10" x 13") has been adopted so that the tables and charts may be read with maximum ease and precision. Pp. 87, including 30 drawings, 25 charts, and 24 tables. Price \$5.00.

Address Orders to

### THE TECHNOLOGY PRESS

Room 3-219, M.I.T.

Cambridge, Massachusetts

William H. Coburn, '11

William F. Dean, '17

### William H. Coburn & Co.

INVESTMENT COUNSEL

68 Devonshire St.

Boston, Mass.

### MONSANTO CHEMICAL COMPANY

*Merrimac Division*

EVERETT  
MASSACHUSETTS

*The largest and oldest  
chemical manufacturer in New England*

### NORTHEASTERN UNIVERSITY

### SCHOOL of LAW

DAY PROGRAM—Three Years  
EVENING PROGRAM—Four Years

• • •

A minimum of two years of college work required for admission.

A limited number of scholarships available to college graduates.

LL.B. Degree conferred  
Admits men and women

47 MT. VERNON ST., BOSTON  
Near State House

## THE INSTITUTE GAZETTE

(Concluded from page 457)

### Debaters Active

THE M.I.T. debating team had one of its best seasons this year, participating in 45 intercollegiate debates. Its varsity won-lost average of .687, however, did not equal that of the championship speaking group of 1928-1929. One of the past year's interesting debates was won by two freshmen debating for the first time on the varsity team, who scored a win over Dartmouth College representatives.

Once a small group designed primarily for support of a debating team, the M.I.T. Debating Society is today an organization of about 60 members possessing class A recognition from the Institute Committee and carrying on activities which range from debating itself to management of forums, conferences, and a model senate. Careful planning by successive Presidents and managers, starting with Leonard A. Seder, '37, and Paul A. Vogel, '37, has resulted in the present active organization.

The society is, in fact, divided into two definite groups — one for debate management and the other for operating the society and handling its nondebating activities. These divisions, of course, are co-ordinated by the President of the organization. The old Technology Union, now the Technology Open Forum, is run by the Debating Society. About three forums are held each year. Dr. Compton spoke at one this year on the subject of "Technology and Defense."

Last year, the Debating Society instituted a model senate, which discusses weighty subjects from lipstick to lionesses and operates strictly according to Robert's *Rules of Order*. If the chairman of the senate makes an error in parliamentary procedure, he is replaced by the student who catches the mistake. In order to interest freshmen in debating, the society also manages a freshman debating tournament.

### MAIL RETURNS

(Concluded from page 432)

former engineering group at the university are Ernest C. Webster, an alumnus of Yale and the Sheffield Scientific School; K. Watanabe and Chris Gregory, from the California Institute of Technology; and myself. . . . There are, of course, many Technology graduates in these islands: Benjamin W. Thoron, '22, representative of the Department of the Interior; Harry P. Field, '21; Clarence C. T. Loo, '29; Horace Johnson, '01, and his sons; Frederick Ohrt, '17; William C. Furer, '06; and a number of others.  
*Honolulu, T. H.*

### For the Record

FROM WALTER G. WHITMAN, '17:

To keep the record straight, let me say that, able chemical engineer though he is, Clark S. Robinson, '09, is serving as a lieutenant colonel in the Ordnance Reserve, not as a major in the Chemical Warfare Service.

*M.I.T., Cambridge, Mass.*

# PROFESSIONAL CARDS

## JACKSON & MORELAND

### Engineers

Public Utilities — Industrials  
Railroad Electrification  
Design and Supervision — Valuations  
Economic and Operating Reports

BOSTON

NEW YORK

## H. K. BARROWS, '95

M. Am. Soc. C. E.

CONSULTING HYDRAULIC ENGINEER

*Hydro-electric Developments — Water Supplies. Reports, Plans,  
Supervision. Advice, Appraisals.*

6 BEACON STREET

BOSTON, MASS.

## EADIE, FREUND AND CAMPBELL

CONSULTING ENGINEERS

110 WEST FORTIETH STREET

NEW YORK CITY

*Plans and Specifications — Examinations and Reports*

Power, Heating, Ventilating, Electric, Plumbing,  
Sprinkler, Refrigerating, Elevator Installations, etc.,  
in Buildings and Industrial Plants

J. K. CAMPBELL, M. I. T. '11

## STARKWEATHER ENGINEERING CO.

INCORPORATED

*Engineers and Contractors for Pumping Plants  
Boiler and Power Plants, Cooling Water  
and Heat Recovery Systems*

246 WALNUT STREET, NEWTONVILLE

BIGelow 8042

Wm. G. Starkweather, M.E.  
Cornell '92

J. B. Starkweather, B.S.  
M.I.T. '21

## H. A. KULJIAN & CO.

CONSULTANTS • ENGINEERS • CONSTRUCTORS

*Specialists in*

UTILITY, INDUSTRIAL and CHEMICAL FIELDS

1518 WALNUT STREET

PHILADELPHIA, PA.

H. A. KULJIAN '19

## FABRIC RESEARCH LABORATORIES

INCORPORATED

*Research, Testing and Consulting  
for Textile and Allied Industries*

665 BOYLSTON STREET

Boston, Mass.

W. J. HAMBURGER, '21   K. R. FOX, '40   E. R. KASWELL, '39

## FAY, SPOFFORD & THORNDIKE

ENGINEERS

BOSTON, MASS.

BRIDGES

WATER SUPPLY AND SEWERAGE

PORT AND TERMINAL WORKS

FIRE PREVENTION

INVESTIGATIONS

DESIGNS

SUPERVISION OF CONSTRUCTION

## STANLEY G. H. FITCH '00

CERTIFIED PUBLIC ACCOUNTANT

*of PATTERSON, TEELE & DENNIS  
1 Federal Street, Boston, Mass.*

*Cost Accountants and Auditors — Tax Consultants*

NEW YORK

BOSTON

WASHINGTON

REPRESENTATIVES IN OTHER PRINCIPAL CITIES OF THE  
UNITED STATES, CANADA, ENGLAND AND AUSTRALIA

## MAURICE A. REIDY

### Consulting Engineer

BRIDGES

BUILDINGS

STRUCTURAL DESIGNS

FOUNDATIONS

CONSTRUCTION CONSULTANT AND ARCHITECTURAL ENGINEER

*Estimates and Appraisals*

44 SCHOOL STREET

BOSTON, MASS.

## ROBERT F. MILLER '21

LICENSED PROFESSIONAL ENGINEER (N. Y.)

*of STEVENSON, JORDAN & HARRISON, INC.  
19 West 44th St., New York City  
Management Engineers*

NEW YORK CLEVELAND CHICAGO MONTREAL

Cost reduction methods — Production planning and scheduling  
Wage incentives — Standard costs — Flexible budgetary control  
Sales and Financial problems

## MORAN, PROCTOR, FREEMAN & MUESER

CONSULTING ENGINEERS

420 LEXINGTON AVENUE

NEW YORK CITY

Foundations for Buildings, Bridges and Dams;

Tunnels, Bulkheads, Marine Structures;

Soil Studies and Tests;

Reports, Design and Supervision.

WILLIAM H. MUESER, '22

## BOISSEVAIN and SHAPIRO

### Thermodynamics

### Heat Transfer

### Fluid Mechanics

KIRKland 6900

77 Massachusetts Avenue  
Cambridge, Massachusetts



*AN AID TO INDUSTRY IN LOCATING OUTSTANDING MEN*

PLACEMENT STATUS  
*of*  
1942 GRADUATES

EMPLOYMENT STATUS	<i>Recipients Doctor's Degree†</i>		<i>Recipients Master's Degree††</i>		<i>Recipients Bachelor's Degree*</i>		<i>All Groups</i>	
	No.	%	No.	%	No.	%	No.	%
Have Accepted Employment.....	32	86.49	105	70.95	252	53.73	389	59.48
Army.....	2	5.40	13	8.78	134	28.57	149	22.78
Navy.....	..	..	27	18.24	67	14.29	94	14.37
Unclassified.....	3	8.11	3	2.03	16	3.41	22	3.37
TOTALS.....	37	100.00	148	100.00	469	100.00	654	100.00

† Doctor's degrees as of May 28, 1942.

†† Master's degrees as of May 28, 1942.

\* Bachelor's degrees as of April 27, 1942.

PLACEMENT BUREAU

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

CAMBRIDGE, MASS.

*AN AID TO ALUMNI IN FINDING DESIRABLE POSITIONS*

---

# TECHNOLOGY MEN IN ACTION

THE ALUMNI FUND—ITS PROBLEMS AND GROWTH

---

## WAR SAVINGS BONDS, WAR SAVINGS STAMPS, INCOME TAXES . . . . . AND THE ALUMNI FUND

As these lines are written, American tanks are battling in the Libyan Desert; American bombers are blasting Rabaul and Lae and the Andamans; American pursuit ships are sweeping the skies over the Ukraine. American antitank guns, destroyers, submarines, and motor transports are active on the fighting fronts of the world. They are speeding the final day of victory.

THESE things are made possible by you — by your purchases of war savings bonds and stamps, by your payment of income taxes. You, as an American, realize this, and you are glad that you can play your part. It is no minor role either, supplying the wherewithal for equipping the fighting forces of over half the world. Rather, it is vital to the successful prosecution of this crucial struggle for the survival of our way of life.

THESE things come first. Victory must be achieved before all else.

INDIVIDUALLY, we are all confronted with harassing financial problems as a result. In the readjustment of our personal affairs, what is the position of the M.I.T. Alumni Fund? Is it something which should be set aside for the moment until immediate demands of war are met? Or is it building toward a goal of such importance that present conditions warrant an acceleration?

THE major portion of the gift to the Institute through the Alumni Fund is undesignated. It is held to accumulate until such time as an important need arises. At that time the Fund Board will recommend the use of all, or a part, for specific purposes. The Board has intentionally been given a great amount of discretion, since fixed objectives established now might well be superseded by other and more important needs before they could be realized.

NOT a fixed objective therefore, but definitely an important possibility, was a suggestion made by President Compton in his recent letter acknowledging the receipt of the 1941-1942 Fund. In the Institute's laboratories new methods and equipment, unique and revolutionary in concept, are being developed under government auspices. With the cessation of hostilities the Institute will be in a position to acquire much of this material at most advantageous terms. In some instances it will thereby be enabled to take the lead in applying developments born of wartime necessity to the needs of a world at peace. If when that time arrives, funds are not immediately at hand with which to make these acquisitions, the opportunity to do so may be lost forever. The Alumni Fund could well be a major factor in assuring the continuation of Technology's position of leadership in peace, as that leadership is now being amply demonstrated in war.

THE time to prepare for such an eventuality is now. If postponed until the need arises, it may well be too late. The Alumni Fund is an important adjunct to Technology's future.



*AN AID TO INDUSTRY IN LOCATING OUTSTANDING MEN*

**PLACEMENT STATUS**  
*of*  
**1942 GRADUATES**

EMPLOYMENT STATUS	<i>Recipients Doctor's Degree†</i>		<i>Recipients Master's Degree††</i>		<i>Recipients Bachelor's Degree*</i>		<i>All Groups</i>	
	No.	%	No.	%	No.	%	No.	%
Have Accepted Employment . . . . .	32	86.49	105	70.95	252	53.73	389	59.48
Army . . . . .	2	5.40	13	8.78	134	28.57	149	22.78
Navy . . . . .	..	..	27	18.24	67	14.29	94	14.37
Unclassified . . . . .	3	8.11	3	2.03	16	3.41	22	3.37
TOTALS . . . . .	37	100.00	148	100.00	469	100.00	654	100.00

† Doctor's degrees as of May 28, 1942.

†† Master's degrees as of May 28, 1942.

\* Bachelor's degrees as of April 27, 1942.

**PLACEMENT BUREAU**

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

CAMBRIDGE, MASS.

*AN AID TO ALUMNI IN FINDING DESIRABLE POSITIONS*

---

# TECHNOLOGY MEN IN ACTION

THE ALUMNI FUND—ITS PROBLEMS AND GROWTH

---

## WAR SAVINGS BONDS, WAR SAVINGS STAMPS, INCOME TAXES . . . . . AND THE ALUMNI FUND

As these lines are written, American tanks are battling in the Libyan Desert; American bombers are blasting Rabaul and Lae and the Andamans; American pursuit ships are sweeping the skies over the Ukraine. American antitank guns, destroyers, submarines, and motor transports are active on the fighting fronts of the world. They are speeding the final day of victory.

THESE things are made possible by you — by your purchases of war savings bonds and stamps, by your payment of income taxes. You, as an American, realize this, and you are glad that you can play your part. It is no minor role either, supplying the wherewithal for equipping the fighting forces of over half the world. Rather, it is vital to the successful prosecution of this crucial struggle for the survival of our way of life.

THESE things come first. Victory must be achieved before all else.

INDIVIDUALLY, we are all confronted with harassing financial problems as a result. In the readjustment of our personal affairs, what is the position of the M.I.T. Alumni Fund? Is it something which should be set aside for the moment until immediate demands of war are met? Or is it building toward a goal of such importance that present conditions warrant an acceleration?

THE major portion of the gift to the Institute through the Alumni Fund is undesignated. It is held to accumulate until such time as an important need arises. At that time the Fund Board will recommend the use of all, or a part, for specific purposes. The Board has intentionally been given a great amount of discretion, since fixed objectives established now might well be superseded by other and more important needs before they could be realized.

NOT a fixed objective therefore, but definitely an important possibility, was a suggestion made by President Compton in his recent letter acknowledging the receipt of the 1941–1942 Fund. In the Institute's laboratories new methods and equipment, unique and revolutionary in concept, are being developed under government auspices. With the cessation of hostilities the Institute will be in a position to acquire much of this material at most advantageous terms. In some instances it will thereby be enabled to take the lead in applying developments born of wartime necessity to the needs of a world at peace. If when that time arrives, funds are not immediately at hand with which to make these acquisitions, the opportunity to do so may be lost forever. The Alumni Fund could well be a major factor in assuring the continuation of Technology's position of leadership in peace, as that leadership is now being amply demonstrated in war.

THE time to prepare for such an eventuality is now. If postponed until the need arises, it may well be too late. The Alumni Fund is an important adjunct to Technology's future.



## ALUMNI AND OFFICERS IN THE NEWS

*As They Sowed*

¶ So FRANKLIN W. HOBBS '89 was presented an honorary doctor of science degree at the graduation exercises of Middlebury College. Another honor was his reappointment as chairman of the Congressionally established Textile Foundation to fix textile standards.

¶ So EMORY S. LAND '07, chairman of the Maritime Commission, has as new assistants HOWARD L. VICKERY '21 in charge of shipbuilding and LEWIS W. DOUGLAS '17 in charge of using cargo space.

¶ So HARVEY S. BENSON '12 was elected chairman of the Industrial Research Institute, and WILLIAM R. HAINSWORTH '21 became vice-chairman of the executive committee. They help to promote improved methods and more economical and effective management in industrial research.

¶ So HORACE S. FORD, Treasurer of M.I.T., was elected as trustee of Middlebury College. He has been secretary and treasurer of the Association of University and College Business Officers of the Eastern States, director of the Harvard Co-operative Society, trustee of the Home Savings Bank of Boston, and director of the Liberty Mutual Insurance Company.

¶ So JOHN L. ONCLEY, staff, was awarded a \$1,000 prize from the American Chemical Society for "outstanding research in pure chemistry by a man or woman less than thirty-six years old."

*Speaking the Speech*

¶ Of KENNETH C. REYNOLDS '25, on "Modern Uses of a River"; before the Sigma Xi chapter of the University of California, in February.

¶ Of GEORGE B. WATERHOUSE, staff, on the relation between the iron and steel industry and this country's war effort; before the iron and steel division of the American Institute of Mining and Metallurgical Engineers, in May.

*Penning for Publication*

¶ By LOUIS S. CATES '02, "Foreword," *Mining and Metallurgy*, May, telling of the new mine and works at Morenci, Ariz., to produce 75,000 tons of copper a year.

¶ By LAWRENCE B. CHAPMAN '10, *The Marine Power Plant*, McGraw-Hill.

¶ By WALTER D. BINGER '16 and Hilton H. Railey, *What the Citizen Should Know About Civilian Defense*, Norton.

¶ By JOHN R. PERKINS '20, *A Manual of Municipal Accounting* for small towns in Maine. Marks.

¶ By MARTIN J. BUERGER '24, *X-Ray Crystallography*, Wiley.

¶ By THOMAS R. CAMP '25, "Grit Chamber Design," *Sewage Works Journal*, March.

¶ By HARLAN T. STETSON, staff, "Solar Radiation and the State of the Atmosphere," *Scientific Monthly*, June.

*Around the Round Table*

¶ ERNEST H. HUNTRESS '20 presented a paper on "Some Recent Developments in the Systematic Identification of Organic Compounds," in a symposium at the April American Chemical Society meeting at Memphis. Prominent at the meeting were ROBERT S. HARRIS '28, RALPH C. YOUNG '29, MORTIMER H. NICKERSON '37, RALPH F. PHILLIPS '39, WILLIAM H. REEDER '41, and THOMAS S. GARDNER, ROBERT C. HOCKETT, and CLIFFORD B. PURVES, staff.

¶ At M.I.T., the summer conference on Fire Protection Engineering includes as speakers WALTER R. MAC-CORNACK '03, ERWIN H. SCHELL '12, ARTHUR L. BROWN '13, NORMAN J. THOMPSON '16, ROBERT S. MOULTON '17, PERCY BUGBEE '20, HORATIO L. BOND '23, JOHN E. BURCHARD '23, EDWARD R. SCHWARZ '23, THOMAS R. CAMP '25, HARVEY C. ABBOTT '26, WALTER C. VOSS '32, HOWARD R. STALEY '35, KARL T. COMPTON, President, FREDERICK J. ADAMS, and ARTHUR R. DAVIS, staff.

¶ Those assembling at the forty-fifth annual meeting of the American Society for Testing Materials at Atlantic City in June met with ALBERT G. DIETZ '32, HOWARD R. STALEY '35, and ROY W. CARLSON '39.

¶ Participants at Columbia University in the fiftieth annual meeting of the Society for the Promotion of Engineering Education were FREDERIC L. BISHOP '98, CARLE R. HAYWARD '04, ELMER A. HOLBROOK '04, CARL S. ELL '11, ERWIN H. SCHELL '12, JOSEPH W. BARKER '16, F. ALEXANDER MAGOUN '18, WINTHROP E. NIGHTINGALE '18, CARLTON E. TUCKER '18, DUGALD C. JACKSON, Jr., '21,

EDMUND D. AYRES '22, THOMAS K. SHERWOOD '24, KARL T. COMPTON, President, ANTOINE M. GAUDIN, ERNST A. HAUSER, and REINHARDT SCHUHMANN, Jr., staff.

## DEATHS

\* Mentioned in class notes.

¶ CHARLES I. BARNARD '73, May 11.

¶ BELVIN T. WILLISTON '77, November 19.\*

¶ GEORGE G. LOVERING '78, November 15.

¶ HARRY E. REED '78, October 15.

¶ W. OTIS DUNBAR '79, May 4.\*

¶ FRED E. FOSS '86, January 18.\*

¶ HENRY D. SEARS '87, May 23.\*

¶ GILBERT H. H. SMITH '87, May 5.

¶ WILLIAM G. BESLER '88, May 20.\*

¶ BERTRAM P. FLINT '88, May 16.

¶ THOMAS J. WALKUP '89, May 5.

¶ GEORGE H. GOODELL '92, December 27.

¶ GEORGE S. KEYES '92, May 5.\*

¶ JAMES H. SLADE '92, April 29.\*

¶ WILLIAM G. HOUCK '93, May 5.\*

¶ ERVIN KENISON '93, May 12.\*

¶ ARTHUR A. CLEMENT '94, April 25.\*

¶ CHARLES W. DICKEY '94, April 25.\*

¶ RHODES G. LOCKWOOD '97, April 30.

¶ ISABEL BEVIER '98, March 17.\*

¶ WENDELL W. CHASE '98, March 31.\*

¶ S. MARIA ELLIOTT '98, March 16.\*

¶ LOUIS R. LEONARD '99, April 7.

¶ JAMES MCF. BAKER '02, March 28.\*

¶ THOMAS A. FINNERAN '02, October 5.

¶ FRANK P. MONTGOMERY '02, March 19.\*

¶ FREEMAN N. BULL '04, May 12.

¶ EDWARD C. GROESBECK '06, May 9.

¶ WILLIAM C. GIFFING '07, January 28.

¶ ARAM TOROSSIAN '08, December 6.\*

¶ LEO F. WALSH '14, December 5.

¶ WILLIAM B. GAGNEBIN '19, April 13.

¶ ROSS E. GODDARD '21, March 17.\*

¶ LEIGH J. MCGRATH '21, May 10.\*

¶ HURLEY G. GRIFFITH '21, February 8.\*

¶ ROBERT H. LEE '23, May 22.

¶ GILBERT N. ROSS '23, April 30.\*

¶ WILLIAM G. HOUCK, JR., '29, May 5.

¶ ROSS B. TEEL '38, May 13.\*

## NEWS FROM THE CLUBS AND CLASSES

## CLUB NOTES

*M.I.T. Club of Buenos Aires*

The sudden death of our President, Arthur F. Bennett '03, on December 1 has saddened members of the Club. He was a fine gentleman and was beloved by all his friends. Luis A. Igartua '23 has been elected President to succeed Bennett.

The Club had meetings on October 9, November 13, December 11, and January 15. In March, the members of the Club spent a week end with the Uruguayan Technology men and their wives at Montevideo. In May, a luncheon meeting was held on a Saturday instead of on Thursday as usual, so that it was possible to have in attendance the Argentine Navy men who are assigned to posts too remote from Buenos Aires to allow them to attend a meeting during the week. The special roving reporter who went on the Montevideo trip sent in the following long and interesting account of the week end in Uruguay.

In a wet howling gale, on Friday evening the thirteenth of March, 13 delegates from the Club set out on the night boat for Montevideo to spend the week end as guests of the Uruguayan Technology men. United at the big round table at the end of the dining room of the S.S. *Ciudad de Buenos Aires*, we all spent a jolly evening. In case any cynical reader feels that night boat life is the same the world over, we hasten to insist that, although jolly, ours was a nice, circumspect party, as four Technology wives were in the group. Missing and much missed were the Argentine Navy men of the Club. The rest of us take with a grain of salt their briny line that, due to restrictions incidental to the current state of siege in this country, Navy men are not allowed to leave its boundaries. We feel that their naval experience gave them warning in advance that the river would be very rough the night of the trip, and so they stayed home for fear of getting seasick. However it was, the Navy men as well as the others who could not come missed a wonderful trip.

Up and breakfasted early, we were on deck to see the capital of the Eastern Republic of Uruguay emerge from the morning mist, a scene faithfully reproducing the post cards, complete in every detail down to the flat conical Gargantuan sand pile in the background across the bay. Our glistening, white, little ship seemed conspicuously and appropriately carefree as it took a place along the long pier, in line with the English merchantmen, somber dull grey and rather rusty with that expression of being "too busy just now to bother," but not carelessly kept up. Courteously and quickly passed

through the customs, we were soon in the welcoming arms of our Uruguayan associates. They literally swept us off our feet by their hospitality. In constant attendance, they filled our two days pack full. Only by most careful planning and scheming could they have managed to arrange for us so many things in one week end. For the two days they had us off our feet, they — poor lads in a gasoline-restricted land — will spend many days on theirs, because they were positively profligate with the use of their cars and consumed their gasoline quota for weeks ahead. We were driven everywhere, always the longest way round to see an even more beautiful boulevard or park. Any casual traveler can find any amount of natural beauty in and around Montevideo. But the scenic wonders our hosts brought out for us! You really should come down to see for yourselves.

The city has a strong personal Technology flavor. Of many fine new developments did our guides, referring to different ones of our members, say "Pancho is building this boulevard," or "José designed that park system," or "That is the new American embassy building (the finest on 'Embassy Row'), and it was built by Garcia Capurro [26]." Of course, having installed so much of it themselves, if our Uruguayan confreres do not know where the beauty of their city lies, who should? Seriously though, the landscaping developments going on in Uruguay are indeed remarkable. After the war, when our attention can more happily be turned to such things, we shall go to Montevideo to see at our leisure one of the very finest, most exceptional cities in the world.

But we were not fed exclusively on gorgeous scenery. Always serious boys, we have our plant-inspection trip. Saturday morning we spent prowling through the ultramodern equipment at the Administración Nacional de Combustibles, Alcohol y Portland. We were much impressed by this fine plant which is operated by the government and refines all the oil for the country. We shall long remember the banquet luncheon tendered us by Vegh Barzon, President of A.N. C.A.P.

At a reception given Saturday afternoon by the American Ambassador especially for the M.I.T. group, we were honored to meet the American diplomatic staff and distinguished guests. This attention on the part of Ambassador and Mrs. Dawson was much appreciated by us all.

Saturday evening was all out at the splendid casino at Carrasco Beach. We toasted and dined, pirouetted and rouletted, and had a wonderful time. Congas and tangos and rumbas and no speeches featured the evening. Casimiro Lana-

Sarrate '18 finally caught us at dinner the next day with his speech — a few impromptu words hot from a well-worn slip of paper out of his breast pocket. With warm and carefully chosen words, he told the gathering how much we appreciated the attentions we were receiving in Uruguay.

On Sunday after dinner at a charming old inn up the river, we enjoyed a pleasant interlude in the park nearby. The wives were greatly relieved to find a playground where their immature charges could amuse themselves for long enough to let the ladies fix up for picture taking. Richard W. Plummer '26 and Luis A. Artola '22 had such a good time that we couldn't get them to quit. As proved by the snaps, they kept going to the top again.

No better proof of the success of the outing can be offered than the following. Originally we had intended to have a joint meeting with the Montevideo men every year — one year at Buenos Aires and the next down the river. This was the first of these joint meetings. By the end of the first day, we unanimously decided that we should have an outing together every year at each place — in the summer at Montevideo, which was the party we were then having, and in the winter at Buenos Aires. Well, as things continued increasingly happy for us all, we determined to have the return meeting in Argentina as soon as possible that same summer, and before we left the shores of Uruguay the date had been set — the long week end over the first of May, six weeks later!

The outing was a good thing, too, in breaking down some of the stiffness that exists between men who meet for luncheon only once a month. As one of the Uruguayan wives cutely put it, the first day she was a bit shy about speaking English with us, but now (and here perhaps the word she used was not a mistake) she talks along freely and comfortably in English, because as she has gotten to know us she does not "respect" us at all.

Your reporter had to remain in "Monte" for a few days on business. He became acquainted with a most interesting eating place, which has such a strong atmosphere of Durgin-Park that Technology men may like to hear about it. Whereas the Boston market's pride is very stiff and formal, however, this Uruguayan place is quite the contrary. In the main provision market, the one opposite the customs house along the water front, one Señor Peloduro keeps a wine stall. As a thriving side business, he supplies hot soup, sandwiches, and grilled tidbits to hungry and appreciative ship hands, dock workers, and frequenters of the market. It's one of those direct from factory to



consumer arrangements, the food being passed fist to fist across the counter without being touched by other hands.

Peloduro makes special provision for a few selected gourmets who regularly lunch there. At a long bench, which just fits between his counter and the wine shelves, he allows these friends to group around, sitting not quite opposite one another but a bit staggered because there is not room on the board for two plates directly in line. Each man is an expert at selecting food, and each brings his contribution toward the meal. First the fresh lettuce and firm tomatoes are put on the pipes of Peloduro's beer cooler, then the fresh vegetables in season are turned over to the cook for preparation, and the meats are put on the grill — each man having the kind that most struck his fancy that day, and which he himself just selected at his favorite meat stall. While waiting so tantalizingly close to the grilling meat, a few of Peloduro's cocktails are tasted, or perhaps "guindado," the famous Uruguayan cherry brandy, is sipped. When Peloduro has to sell a bottle of wine from the lower shelf that forms the back to the bench, the diners demonstrate teamwork by all bending simultaneously from the waist to free a space for him to get at the bottles. Style note: our napkins were immaculately ironed and best quality sugar bags, slit and opened out. The place has atmosphere! — ROBERTO J. OTTONELLO '22, *Secretary*, Azcuena 1031, Buenos Aires, Argentina, S.A.

### *Technology Club of Central Ohio*

Following its usual custom, the Club held an annual dinner at the University Club for Technology Alumni, their wives, and guests. The guests of honor were Harold W. Bibber '20 and Mrs. Bibber, who have been active in our alumni group for a number of years. Professor Bibber has tendered his resignation as professor of electrical engineering at Ohio State University and about September 1 will take up his new duties as dean of engineering at Union College in Schenectady, N.Y. Because for a number of years he was resident engineer in Japan for the International General Electric Company, Dr. Bibber was particularly well qualified to speak about the origin and development of the Japanese race and to discuss the effect of racial blending on the Japanese war psychology.

Robert N. Tucker '28, our President, introduced the speaker, and C. Earl Richards '18 was chairman of the committee on arrangements. The meeting was closed about 10:30 p.m. after the Alumni had had an opportunity to break up into groups and to chat together. — CHARLES J. WARD '15, *Secretary*, Bureau of Bridges, Ohio State Highway Department, Columbus, Ohio.

### *Technology Club of Central Pennsylvania*

The spring meeting of the Club was held at the headquarters of the Engineers

Society in Harrisburg. In view of the number of members who are intensively engaged in war work, we felt fortunate in having nearly our usual attendance, despite the fact that several men had to send their regrets at the last minute, as production lines must be kept going above all else. Those of us from the districts of York, Lancaster, and Harrisburg had a chance to renew the fellowship so important to us all and to learn with pride how our engineers are doing their part in the preservation of civilization.

After the dinner, a short business meeting was led by our President, Frank A. Robbins, Jr., '02. The present officers were re-elected for the ensuing year. A short discussion covered our plans for the coming season, especially in regard to the frequency of meetings in the face of the more limited transportation facilities and the increasingly intense duties of our members. Due regard for these forecasted conditions will be made, however, when the time comes, and if possible the meetings will be called as usual.

Our speaker for the evening was Edgar E. Hume '21, a colonel in the Army, who is at present second in command at the Carlisle barracks at the Medical Field Service School, Carlisle, Pa. Colonel Hume has been decorated with the Distinguished Service Medal, has been honored by 30 countries, and has also received nine American and foreign honorary degrees. Now a veteran Medical Corps officer, he saw service on the Mexican border and overseas during World War I. He reached the rank of lieutenant colonel at the age of 28 and at that time was the youngest commander of a large medical unit in the Army. At the time of the meeting, Colonel Hume had just returned from a speaking tour in Canada undertaken at the request of the Canadian government, and we were indeed fortunate to be able to have him with us and to learn from him the important work that is being carried on at the Carlisle barracks.

Colonel Hume briefly traced the long history of our country's oldest army post, founded in Carlisle in 1752. He mentioned its use as a cavalry and artillery post in the Civil War and told how in 1921 it was turned into the Medical Field Service School. Medicine is not taught there, but medical officers are trained in the art of war over a period of two or three months. Preventive medicine is stressed as particularly important, since disease causes war's greatest losses. The type of instruction deemed essential for a medical officer covers the following major departments: military art, including map reading and the co-ordinated activities of the various branches of the Army when in the field; training of officers who in turn train medical soldiers; science of logistics, or the moving of supplies and troops; military sanitation, including the problems of water purification, waste, and sewage disposal under the conditions at hand; and administration or the proper care of men, including considerations of economy and close co-operation with the commanding officer as to effectives avail-

able for action. We learned of the various other activities carried on at the school, such as the publication of medical bulletins, the training of men to withstand danger without flinching, the application of medical service in conjunction with demonstration troops who reproduce field conditions as nearly as possible, and the many other phases of training that a medical man must have to become a medical officer. We also learned that all of this was for the main purpose of conserving the fighting strength and keeping fit men fit. At present approximately 1,500 officers are continuously enrolled in this very active school.

After he had answered the numerous questions at the conclusion of his talk, Colonel Hume was enthusiastically applauded for his splendid presentation of this important work. Since he is a fellow Alumnus, we felt especially proud to have such a fine man in our midst.

Those present included the following: Louis S. Morse '96, Edgar A. Weimer '98, Frank A. Robbins, Jr., '02, Percy E. Tillson '06, George E. Hodge '13, Gardiner C. Wilson '15, Francis E. Thomas '17, Eldor J. Mink '22, Breese J. Stevens '23, Francis A. J. Brown '26, Andrew R. Burgnoni '26, John P. Connelly '28, and James E. Hazeltine, Jr., '40. Guests were C. S. Breese, Kansas State '12, and son Robert K. Breese; Edward C. Higgison; and John T. Hummer and son John L. Hummer '43. — GARDINER C. WILSON '15, *Secretary*, Armstrong Cork Company, Engineering Department, Lancaster, Pa.

### *M.I.T. Club of East Tennessee*

The annual meeting and dinner of the Club was held at O'Neil's Cafe in Knoxville on Friday evening, April 24. Van-court M. Hare, Jr., '23, President of the Club, presided. Twenty-five Technology men and guests were present.

During the dinner the members sang songs and were entertained by Dale Yambert and a quartet. The thanks of the Club were extended to Mrs. B. R. Fuller and Mrs. A. R. Holbrook for the table decorations and flowers.

The reports of the Secretary and Treasurer were presented and accepted as read. On behalf of the Club, Erwin Harsch '20 presented the Secretary with a Technology pin as a tribute to his services for the Club and for his work as honorary secretary for the Institute in this district. Officers for the year were elected. The report of the nominating committee was presented by Dana M. Wood '06. The following were elected: President, Howard P. Emerson '28; Vice-presidents, Joseph H. Kimball '94 and Thomas D. Lebbly '17; Treasurer, Bernard R. Fuller '09; and member at large of the executive committee, Robert T. Colburn '27.

The members were entertained with a Bingo game put on by the delegation from Chattanooga. Prizes were won by Birkenwald, Davis, George, and Harsch. Harsch then presented some very interesting Tennessee Valley Authority movies showing the dynamiting of bridges by army engineers. The main feature of the

evening was the showing of the new colored movies of Technology. These were a real treat, and they brought home to every Alumnus the great expansion and growth that M.I.T. has undergone in recent years.

The following Alumni were present: Arthur R. Holbrook '04, Dana M. Wood '06, Bernard R. Fuller '09, Albert S. Peet '09, John M. Fitzwater '10, Theodore B. Parker '11, Gene N. Burrell '13, Frederick A. W. Davis '15, P. R. Pizzorno '16, Thomas D. Lebby '17, Erwin Harsch '20, George E. Farmer '22, Emil S. Birkenwald '23, Robert T. Colburn '23, Robert B. George '23, Vancouver M. Hare, Jr., '23, Joseph C. Nowell '23, Walter K. Johnson '27, Howard P. Emerson '28, William Nixon '31, Reginald H. Burdick, Jr., '32, Paul H. Schneider '39, Carlton A. Chamberlain '40, Lars H. Nordenson '41, and Dale Yambert. — ALBERT S. PEET '09, *Secretary*, Knoxville Glove Company, Post Office Box 138, Knoxville, Tenn.

### Technology Club of Kentucky

On May 5 a bang-up spring meeting was held at the Pendennis Club in Louisville. Twenty-three Alumni and five guests attended the preliminary warm up and the steak dinner which followed. Henry Hutchings, Jr., '21, a colonel in the Army, who is engineer in charge of the Louisville district, delivered an interesting speech about construction during the emergency. He told of the engineer's place in our present economy, a particularly interesting subject. *Assembly Lines of Defense*, a moving picture of the Chrysler tank arsenal, and *Total War*, a historical film, completed our entertainment.

It is unfortunate that even more Alumni were not able to attend the meeting, which was one of the most successful held in recent years. Several gatherings are being planned for the summer, and notices will be mailed to all Alumni who are known to be in the vicinity of Louisville. Will any Alumnus in the area who did not receive a notice for the May meeting please get in touch with the Secretary so that he will receive notices of the good times ahead? The alumni gatherings we are planning will give you needed relaxation in the days ahead. — ALBERT J. KLEMK '36, *Secretary*, 1843 Roanoke Avenue, Louisville, Ky.

### Technology Club of Philadelphia

About 60 members turned out on May 14 for the last dinner of the current club year, held at Kugler's Restaurant, Peacock Alley, Philadelphia. Philip M. Alden '22, our President, acted as toastmaster. We held a short business meeting, and three proposed changes in the bylaws of the Club were adopted. We voted to contribute \$50 from the club treasury toward the Alumni Regional Scholarship. Greville Haslam '15, chairman, announced that 17 candidates for the scholarship had been interviewed by the committee as well as by Harold E. Lobdell '17, Dean of Students at the Institute, and Thomas P. Pitre, Associate Dean.

Our guest speaker was George R. Harrison, who is Professor of Physics, Director of Applied Physics, Director of the Research Laboratory of Experimental Physics, and newly appointed Dean of Science at M.I.T. He proved to be one of our most entertaining guest speakers. His chief subject was the work of the National Defense Research Committee, which consists of a group of eight prominent scientists reporting only to the executive department of the government. This committee, headed by James B. Conant, President of Harvard University, has charge of all scientific research to aid the present war effort. Dr. Harrison related many humorous anecdotes of situations arising in this work and told of some of the ridiculous ideas presented from time to time by well-meaning individuals who are anxious to do their parts. He further stated that M.I.T. research today involves only such work as relates to the war effort and predicted that many useful tools and methods would arise from present war research to speed up science after the war. — GEORGE T. LOGAN '29, *Secretary*, 1000 Chestnut Street, Philadelphia, Pa. HENRY F. DALEY '15, *Review Secretary*, B. F. Sturtevant Company, Cresmont and Haddon Avenues, Camden, N.J.

### Washington Society of the M.I.T.

The Society held its annual ladies' night dinner at the Y.W.C.A. at 5:30 P.M. on April 22. As world conditions made the usual elaborate affair inappropriate, an informal meeting was arranged, with the speech preceding the dinner. Our guest speaker, the Rev. Edmund Walsh, S.J., Vice-president of Georgetown University and regent of the School of Foreign Service, gave us an unusually interesting address. He recalled his younger days, when he attended Lowell Institute lectures in the old Technology buildings. He said that at the present time the impact of war is most evident in Washington. His schedule of touring camps throughout the country to speak to soldiers included 27 assignments in the same number of days.

The reaction of the man who is going to fight this war is very interesting. Dr. Walsh finds him somewhat critical of us in Washington and brutally frank in his questions. He has found well worth while explaining to the soldier the tremendous issues at stake, to let the man realize the issues more fully. Today, said Dr. Walsh, we want more than a blind faith; we want our men to have firm convictions of their purposes. He feels that not at all farfetched is conversion of the olden saying, "I am a Roman citizen," to "I am an American citizen," particularly, "I am an American soldier." We must fight wrong thinking such as, "We will win this war because we won every other war." Dr. Walsh feels that the period should be before the word "because." His interesting outline of the development of the German state and philosophy since the early Nineteenth Century made his audience fully realize that *Mein Kampf*

was simply a rewording in modern terms of the teachings of many old German philosophers. — MERTON L. EMERSON '04, our President, conducted the meeting with his usual genial manner and dispatch, and the enthusiastic attendance testified to the success of our ladies' night. — AMASA M. HOLCOMBE '04, *Secretary*, 428 Munsey Building, Washington, D.C. WILLIAM K. MACMAHON '22, *Review Secretary*, Rosslyn Gas Company, 3240 Wilson Boulevard, Arlington, Va.

## CLASS NOTES

### 1868

News of this first Class of M.I.T. can appear only occasionally, but it is always interesting. Charles E. Locke '96, Alumni Secretary, sent in the following information about the members of '68. At present the Register of Former Students carries 18 names for the Class, but for many years the Alumni Office has had no addresses for 16 of these. The two who are known are Robert H. Richards, Professor Emeritus of M.I.T., who is still registered as Secretary of his Class, and Daniel M. Wheeler of the Berkshire Street Railway Company in Pittsfield, Mass., who is still on the job.

Professor Richards still occupies the house at 32 Eliot Street, Jamaica Plain, which he and Mrs. Richards acquired away back in 1874. He is due to reach the age of 98 on August 26. Though his memory is not what it was, he still maintains a keen interest in nature, getting out into his garden every day when the weather is suitable, to sit with his field glasses watching birds. A daily automobile ride enables him to see the country, and this ride more often than not calls for an extended stop on the shore of the Charles River Basin in front of the Institute, where he can watch the sailing which was always one of his hobbies. Over a year ago Richards had a rather serious heart attack, but he made a good recovery, so that last summer he was able to go to his camp at Randolph in the White Mountains, thus maintaining a custom which has been unbroken for a long series of years. He returned in the fall with 15 extra pounds added to his weight and very much benefited. He lives a quiet and well-ordered life, sleeping well, eating well, and having no aches or pains. He receives most excellent care from Miss Georgina Matson, who serves as his right hand in the capacity of secretary, chauffeur, housekeeper, and general manager. As far as one can foresee, we have the prospect of having Professor Richards with us as the grand old Alumnus of M.I.T. for some years to come.

Daniel M. Wheeler, the other member of the Class of '68 who is so well known, continues most active. He is only two years younger than Professor Richards. Honorary President of the Berkshire Technology Club, he is in excellent health and is still active in his business every day. He retired 25 years ago from the office of state inspector of railways in



1868 Continued

Massachusetts, but he immediately entered the employ of the Berkshire Street Railway Company. Previous to the state job, he was construction engineer for railroad projects in the West and in South America. His work included the construction of three tunnels and two bridges over the Mississippi River. For years he had active, responsible management positions with the Berkshire Street Railway Company, but now his job might be called that of a curator of real estate for the organization, or perhaps liquidator is a better term, because there is a lot of real estate and rights of way owned by that company which are in the three neighboring states that the lines formerly served, and the firm is gradually disposing of real estate which is no longer of value to it. He has his own choice of office hours, but ordinarily they run from 9:00 A.M. to 3:00 P.M. The job calls for considerable traveling, and it is not unusual for him to run off 75 or 100 miles in a day. Naturally he deplores the passing of the street railway, but realizes that such railways cannot continue indefinitely to be run at a loss. Just at present, under war conditions, some of these railways that have been scrapped would serve the country very nicely. Two years ago he went all alone to the New York World's Fair. He found the exhibits very interesting, but he did not feel that the buildings themselves, and the setting, equalled the Philadelphia exposition of 1876, the Chicago exposition of 1893, or the St. Louis exposition of 1904, which he visited.

## 1877

On November 19, Belvin Thomas Williston, our faithful and efficient Secretary, died. He was the third Secretary that the Class ever had. The first one, Walter Jenney, served only three months when he was elected class president. Richard A. Hale succeeded him and served for 52 years. At his death in 1928, Williston was elected and served for 13 years. Although he was 88 years old, he was active, energetic, and in apparent good health until four days before he died. On October 20 he drove from his summer home in Sterling, Mass., to his home in Somerville. On the way he stopped to pay a call on our classmate Wood at his farmhouse in Townsend, Mass. Wood evidently gave him some of his farm products, for on November 2, only 17 days before his death, Williston wrote to Wood thanking him for the additions to his larder. This was his last letter to a member of the Class.

Williston's son William H. was graduated from Technology in 1902 and a grandson Belvin was graduated in 1931. His wife at her death made the Institute a beneficiary of a part of her estate. Thus is shown the loyalty and vital interest in Technology possessed by our late Secretary and his family.

On April 24 the undersigned called upon Williston's widowed daughter-in-law at her home in Somerville. She received him cordially, gave him the information recited above, and turned over all papers pertaining to '77.

Fourteen of us now represent the Class of '77. All of these were invited to meet at luncheon at the Hotel Statler at noon on April 25 to celebrate the sixty-fifth anniversary of our graduation. All of the 14 acknowledged the invitation, and six accepted: Beeching, Clarke, Higgins, Mudge, Kittredge, and Sherman. Kittredge was elected secretary.

At the Alumni Banquet held the same evening there was only one Alumnus of a Class that antedates '77. C. Frank Allen '72, a professor emeritus of the Institute, was there. Despite his 90 years, he is still alert and active. Your Secretary represented '77.

Several months ago Hibbard said that in 1875 someone told him that our classmate Charles J. Colgan had posed for the "Minuteman" in Concord, Mass. This famous statue was sculptured by Daniel C. French '71. Inquiries were sent out, and through Taber we reached one of Colgan's sons, who now lives at Fairmont, W. Va. (By the way, the oldest Colgan son was '77's class baby.) Colgan's son, Charles Judson, confirmed the report about the statue and said that through mutual friends Daniel French saw a good deal of Colgan during the latter's stay at Technology, and he asked him to pose for the statue. The head and face are French's own original design, but the torso and legs are Colgan's. — GEORGE W. KITTREDGE, *Secretary*, 592 North Broadway, Yonkers, N.Y.

## 1879

We regret to announce the death on May 4 of W. Otis Dunbar, II, at his home, 1529 Tenth Street, Altoona, Pa., after three months of illness. Mr. Dunbar was a retired assistant engineer of tests for the Pennsylvania Railroad Company. At the time of his retirement in 1923, he had been with the organization for 44 years.

Mr. Dunbar was born on September 20, 1857, in Canton, Mass. He was the son of John and Helen (Otis) Dunbar. His wife, the former Elizabeth Mathews, died ten years ago. Members of his family include two daughters, Mary Elizabeth and Virginia, who is active in the American Red Cross in Washington, D.C. Dunbar also leaves two brothers, Kinsley Dunbar of Brookline, Mass., and Oliver E. Dunbar of Amherstburg, Canada. Burial was in Canton, Mass.

## 1886

As reported in the March issue of The Review, notice of the death of Fred E. Foss on January 18 was received just as class notes were being forwarded to the printer.

Foss came to the Institute from Bates College in 1883 and was graduated from the Course in Civil Engineering with our Class. His ability and the quality of his work were such that he was asked to return to the Institute the next year as an assistant in the Civil Engineering Department. He preferred, however, to begin active engineering practice at once, and for the next five years he worked at railroad construction and maintenance in the Middle West. In 1891 Foss was again

asked to return to the Institute to arrange the material and instruct a new railway and highway engineering course. After completing two years of successful work as a writer and teacher, he resigned from the Institute in order to go to Pennsylvania State College as head of its department of civil engineering.

In 1907 Foss left State College to become head of the civil engineering department of Carnegie Institute of Technology. Two years later he went to the Cooper Union Institute of Technology in New York City, as head of the civil engineering department in that institution, where he served for the next 29 years. He was retired in 1928 at his own request and was made professor emeritus.

During the World War, Professor Foss was given a year's leave of absence from Cooper Union so that he could serve as director of the testing laboratory in Pittsburgh for the Ordnance Department of the United States Army. For many years he was a civil engineering examiner for the Municipal Civil Service Commission of New York City. He was a member of the American Railway Engineering Association, a life member of the American Society of Civil Engineers, and a member of other technical and scientific organizations. — ARTHUR G. ROBBINS, *Secretary*, 12 Grove Street, Winchester, Mass.

## 1887

At the time these notes are being written, those members of the Class who find getting away possible are making arrangements to attend our fifty-fifth reunion. Some of the men whom we see but rarely have sent their regrets and one of them optimistically wrote: "I hope to see you in 1947." Gelett Burgess, our toastmaster at the fiftieth annual class dinner at Marblehead, announced his inability to be with us at Plymouth again this year. Burgess says that his book *Look Eleven Years Younger* made a very good hit, and his latest, a novel called *Ladies in Boxes*, which his publishers call, "the aristocrat of mystery stories," has just been put on the market.

The Secretary regretfully announces the death of our classmate Henry D. Sears at his home, 53 Elm Street, Worcester, Mass., on May 23. He was one of the most loyal of them all and very rarely missed a dinner or a reunion up to the time of his retirement in 1937. The following obituary is from the *Worcester Gazette*: "... He was born in Dorchester, March 7, 1866, son of Abraham W. and Anna (Atherton) Sears. ... His industrial life had been ... with the General Electric Company, Lynn, and later with offices in Boston as vice-president and general sales manager of Weber Electric Co. of Schenectady, N.Y. He resided in Framingham Center until he retired from business, due to ill health in 1937, at which time he came to live in Worcester.

"He is survived by his widow, the former Gertrude Townsend of Lynn; five children: Mrs. Leonard C. Bigelow of Framingham Center; Mrs. Warren G.

1887 Continued

Davis of Worcester; Lieut. Col. Richard Sears of Fort Sam Houston, Tex.; Mrs. Richard N. Taliaferro of Dedham; and Mrs. Charles Kingsley, Jr., of Lexington; a brother, Nathan F. Sears of Wellesley; a sister, Mrs. Mary LaMerlee in Switzerland, and nine grandchildren. . . . — NATHANIEL T. VERY, *Secretary*, 15 Dearborn Street, Salem, Mass.

## 1888

Charles G. Merrell of 305 Edgewater Drive, Dunedin, Fla., formerly of Cincinnati, did not come to the class dinner on June 2 on account of the distance and the fact that he is not as good a traveler as he once was, which is true of most of us. Merrell said: "Four years ago I bought a home here in Florida and, strange to say, we find that where we are located right on the Gulf we have about as good a summer resort as a winter one. Only Maine and perhaps New Hampshire could be superior, and the bathing in Maine is so cold that only youngsters can stand it. I shall be glad to see any of the Class who can come here. The latch-string will be out except in August and September, when we try to see our children and eleven grandchildren." Dunedin is near Clearwater on the west coast of Florida, where the climate is good the year round. — Mr. and Mrs. John William Linzee of Beacon Street, Boston, have announced the marriage of their daughter Theodora Marylyn to Arthur Whittaker on Saturday, May 16, in Washington, D.C.

Ted Foque of Northome Beach, Wayzata, Minn., wrote as follows: — "Out here, far from both coasts, we do not see much of the war activities. We have defense plants, of course, and that sort of thing, but none of the glamour to take our minds off the sorry mess. Much of the time even Fort Snelling looks like a football stadium after a game. And then you write in your column that you dodge soldiers and machine guns to go in swimming! Oh yeah — I can see you swimming in Maine in May. To add to my depression, you sent me an invitation to Ned Webster's dinner, probably anticipating the picture of me sitting here twiddling my thumbs while you were having a wonderful time at Chestnut Hill. You were right, for I could not get east. At that time our older grandson was expected home on a short leave before going into training, and I did not want to miss seeing him. Glad you had a wonderful time."

The most distinguished of our several women graduates, Marion Talbot of Chicago, held professorships of sanitary science and household administration and numerous other faculty and administrative positions at the University of Chicago for over 40 years. She wrote as follows in reply to her invitation to Ned Webster's dinner: "If all the members of '88 played their parts as well as Webster and you, there would be a 100 per cent turnout at the class dinners. I presume there were many others who found distance too great an obstacle to overcome to attend the reunion in Boston."

I received a telegram from Mrs. W. G. Besler advising me that her husband and our classmate, William G. Besler, had passed away on May 20 at their home in Plainfield, N.J. His death was not unexpected, for when I last called on him on April 1, he barely recognized me. In the fall of '84, Besler came to the Institute with us as a freshman from Galesburg, Ill., on leave of absence from the Chicago, Burlington and Quincy Railroad. On his return he was advanced to the position of trainmaster of the Chicago division and in 1898 to superintendent of the St. Louis division. At that time he was elected president of the St. Louis division of the Central Association of Railroad Officers, as well as president of the St. Louis Railway Club, the largest club of its kind in the world.

In 1899 Besler became division superintendent of the Philadelphia and Reading Railroad in Reading, Pa., and in 1900 general superintendent. Two years later he became general manager of the Central Railroad Company of New Jersey with offices in New York City. In 1908 he became vice-president, later president, and in 1926 chairman of the board of that railroad, a position he held until his retirement. He lectured at Harvard on engineering in railroad work.

Besler leaves, besides his wife, a daughter Helen, who was graduated from Wellesley in 1913. She went abroad as a Y.M.C.A. entertainer in the last war, was in the battle of the Argonne, and was under fire there until the Armistice. She was nicknamed Bobby and was made an honorary colonel of the Fifty-eighth Division. Besler also leaves two sons, George D. and William J., who invented "the first and only practical steam-motorvated airplane." Besler was one of the most popular men in the Class and by all odds the best story teller. He will be sadly missed at all future class reunions and dinners. — BERTRAND R. T. COLLINS, *Secretary*, Chebeague Island, Maine. SANFORD E. THOMPSON, *Assistant Secretary*, The Thompson and Lichtner Company, Inc., 620 Newbury Street, Boston, Mass.

## 1890

Jack Crane came from Washington for the Alumni Banquet, which was advanced to April 25 because of the war. A. F. Brown, Goodwin, Sherman, and Packard also attended. — A shortage of news induced us to write to a few members of the Class, and we hope to go down the line and get as satisfactory replies as we had from these two. Colonel Waite wrote: "I was glad to get your note. A year and a half ago I was called back to Washington and asked to set up the war project unit. To do this I had to give up everything else I was doing. The Executive Office of the President desired an independent check and an inspection on all the war construction going on in this country as well as in the outlying districts. We are directly under the Bureau of the Budget. As you may well imagine, the task has been most interesting but rather severe. I find my nose pretty well held to the grindstone. Poland is in Wash-

ington with the Board of Economic Warfare, as consultant, transportation unit of the economic warfare analysis, Far Eastern Division branch. His home address is 1675 31st Street, Northwest, Washington, D.C. Billy is also very busy, as his wide experience in the Orient and the Mideast has made him a most valuable adviser in the present situation. My best to all the fellows when you see them."

We are sorry to hear that Captain Brownell isn't physically quite up to returning to the Navy. He wrote: "I have been out of health the past year or so, and, consequently, I stay in Newport and haven't been called to any duty. Since I can't get a name for it, I suspect it's age. I'll be 75 in September, and that's not youth. There aren't any great-grandchildren yet. Five of the family, including me, are in the service in one way or another as commissioned officers, so we are well represented."

The Secretary was fortunate enough to run into Willard Tilton on the street recently and is glad to report that he looks hale and hearty. He said his duties as treasurer of a couple of charitable organizations, with the information now required by the Federal government concerning their funds, keep him fairly well occupied.

The first report of the M.I.T. Alumni Fund shows that 15 men in our Class had already contributed by May 15. Although I fear that few, if any, of us will have our incomes increased as a result of the war, the Class stands second in percentage of its assigned quota. — GEORGE A. PACKARD, *Secretary*, 50 Congress Street, Boston, Mass. HARRY M. GOODWIN, *Assistant Secretary*, Room 4-242, M.I.T., Cambridge, Mass.

## 1892

At the fiftieth anniversary of our graduation, the Class was well represented at the functions of the Institute and the Alumni Association. Those attending were H. A. Burnham, Carlson, C. H. Chase, R. D. Chase, Dean, Fairfield, French, Fuller, E. C. Hall, J. W. Hall, Hutchinson, Ingraham, Kales, Knudsen, Littlefield, Locke, Maynard, Norcross, Nutter, Ober, Palmer, Park, Parrish, Richardson, Rowell, Sargent, Schneider, Sweetser, Tidd, Webb, and Worthington.

At the Class Day exercises, President Kales introduced Harry J. Carlson as the orator for the Class, members of which occupied seats reserved for them in the front of the hall. Portions of Carlson's address have been included in the Institute Gazette section of this issue of The Review. On the following day at the graduation exercises, '92 men wore caps and gowns, marched in the academic procession, and occupied seats on the stage. Following these exercises, President Compton gave a luncheon for the Class at his residence.

At the get-together at the Hotel Statler preceding the annual Alumni Banquet, the members enjoyed a period of sociability and refreshment. Letters from members who could not be present were



1892 Continued

read. These included those of Severance Burrage, Carleton E. Davis, William Green, Mary Lovering Holman, Mrs. Newkirk in behalf of her deceased husband Walter, Mrs. Slade for Harry who was seriously ill, Francis Walker who was recovering from an attack of pneumonia, and Edward C. Wells. At this meeting a business session was held, and we voted that the Class make a gift to the Institute. An account of this presentation you have received from your Secretary. Also, at this meeting Miss Julia M. Comstock, who has finished 50 years of service to the Institute, was elected an honorary member of the Class. Announcement of this action was made at the banquet by President Kales, and the "Rackety Whack" cheer resounded. Knudsen from Los Angeles made his bow as the man who had come from the greatest distance. Everyone expressed great satisfaction and enjoyment at our informal observance of the anniversary.

Only a few days following the celebration, we were shocked to receive the notice of the deaths of James H. Slade on April 29 and George S. Keyes on May 5. — CHARLES F. PARK, *Secretary*, Room 5-111, M.I.T., Cambridge, Mass.

## 1893

Charles M. Spofford was recently elected vice-president of the American Society of Civil Engineers, representing zone one, which includes New York, portions of Pennsylvania, New England, Eastern Canada, Newfoundland, and all territory outside of North America. His other activities with the society include membership on the board of direction 1925-1927, chairmanship of the waterways division in 1933-1935, chairmanship of the Alfred Noble prize committee 1931-1935, membership on the Herbert Hoover Medal award committee since 1940, chairmanship of the society's committee on the Tacoma Bridge failure, and membership as a society representative on the advisory committee on long span suspension bridges of the Federal Works Agency. He was also president of the Boston Society of Civil Engineers in 1918 and is a member of that society, as well as the Institution of Civil Engineers, the American Society for Testing Materials, the American Railway Engineering Association, the Society of Colonial Wars, and Tau Beta Pi, Chi Epsilon, and Sigma Xi, honorary fraternities.

Spofford was Hayward Professor of Civil Engineering at M.I.T. from 1909 to 1940, head of the Department during most of this period, and chairman of the Faculty for two years. Since 1940, he has been Hayward Professor of Civil Engineering Emeritus and has devoted his entire time to the affairs of Fay, Spofford and Thorndike, 11 Beacon Street, Boston. Spofford's books *The Theory of Structures* and *Continuous Structures and Arches* have been used in engineering schools throughout the world.

William G. Houck, President and Treasurer of the Buffalo Structural Steel Corporation, died on May 5. Marvin Gorham wrote: "His death was not un-

expected, for Will had had a bad heart for years." Houck was born in Buffalo, N.Y., on November 27, 1871, and made that city his home throughout his lifetime. Upon being graduated with the Class in the Course in Civil Engineering, he joined the Buffalo Bridge and Iron Works as a draftsman. From 1895 to 1899 he was with the bureau of buildings of the city of Buffalo, first as iron inspector and then for three years as its structural engineer. In 1899, he joined the Buffalo Structural Steel firm as secretary-treasurer, and became its president in 1906, remaining as head of this organization until his death. During the long period of his management, the company fabricated the steel for a large percentage of structures erected in Buffalo and the vicinity, including, among others, the Larkin Buildings, the Louisiana Street Viaduct, the Hengerer Building, the Chamber of Commerce, the Y.M.C.A. and Men's Hotel, the first Hotel Statler (now the Buffalo), the Lenox, Touraine, and Markeen hotels, lock gates, buildings for the Niagara Falls Power Company, and several industrial plants at Niagara Falls. During World War I, his company fabricated a large tonnage of steel for parts of ships which were assembled, with parts made by others, at Newark, N.J. One of these ships, the *Buffalo Bridge*, was christened by his daughter.

Houck was a member of the Buffalo Club, the Wanakah Country Club, and the Rotary Club. He was a director of the National Gypsum Company, the Buffalo Insurance Company, and the Globe Woven Belting Company. Until five years ago, he had been president of the Buffalo Steel Fabricators Association. He was a thirty-second degree Mason. Surviving him are his wife, Isabel Berrick Houck; and a daughter, Mrs. Harry R. Deffer.

Ervin Kenison, who was for 40 years on the teaching staff at M.I.T., until his retirement in 1933 from the position of Associate Professor of Drawing and Descriptive Geometry, died on May 12 in Huntington, W.Va. He had been at a hospital since May 2, when he suffered a stroke on a train on which he and Mrs. Kenison were traveling to visit their son, Ervin M. Kenison. A native of Charlestown, Mass., where he was born on June 19, 1868, Kenison took the full four-year course at the Institute, being graduated with the Class in the Course in Mechanical Engineering.

In the fall following his graduation, he began his teaching of mechanical drawing and descriptive geometry. For years he made his home in Watertown, Mass., although after his retirement he lived for a time in East Orange and in Bloomfield, N.J., and then returned to Watertown in 1938. He was coauthor of a textbook on descriptive geometry, and notes on warped surfaces and on mechanical drawing. In 1895 he married Mary A. Barker. Of their four sons, the three living are Ervin M., of Huntington, W.Va.; Arthur C. of Wellesley, Mass.; and the Rev. Gordon S. Kenison of Orange, N.J. The other son, Richard W. Kenison, a naval cadet flier, lost his life in 1927 as the

result of a navy seaplane accident at Hampton Roads, Va.

The following changes of address have been reported: Howard R. Barton, 104 Wakefield Street, Hamden, Conn.; Arthur G. Farwell, 684 Riverside Drive, New York City; Louis Levi, Esplanade Apartments, Eutaw Place and Brooks Lane, Baltimore, Md. — FREDERIC H. FAY, *Secretary*, 11 Beacon Street, Boston, Mass.; GEORGE B. GLIDDEN, *Assistant Secretary*, 551 Tremont Street, Boston, Mass.

## 1894

By the time these words are read by our classmates the Secretary will have reached the honorable position of Professor Emeritus, thus catching up with George Haven, Stephen Breed, and George Owen who already have been advanced to this worthy but unremunerative status. That makes four of us from the men who were graduated in '94, or one less than '95 can now boast. Realizing that official duties are terminating is difficult, but the end should be looked upon as an earned reward, rather than an imposed hardship. We all can find many things to do to keep us busy and happy, and under the circumstances now existing, there seem to be abundant opportunities for full-time utilization of all the energy and professional knowledge we possess. The Secretary has received the compliment of appointment as Honorary Lecturer for next year, a post with no fixed duties but conferring the right to have an office at M.I.T. and to offer such lectures or instructing service as can be helpful in these trying times. Thus for another year, as for many years past, the official address of the scribe will be at M.I.T.

Al Tenney is serving again as Class Agent for the Alumni Fund, and he is doing fine and loyal service in this connection. By his efforts, and because we are naturally a very loyal Class, our showing is one of which we need not be ashamed, albeit we could hope for larger representation on the list of contributors and a larger total. The Fund is certainly something that should be enthusiastically supported. It will mean much to the Institute in future years, so give Tenney all the help you can, both by personal contributions and by advice as to the location of members of the Class about whose addresses we have been in doubt.

Through Tenney's reports the Secretary has learned recently of the death of Arthur A. Clement in Chicago on April 25. His passing will come as a surprise and shock to most of us, and it will cause many pangs of deep regret, for we all remember Clemmy as one of our most engaging and jovial members. He was a great contributor to the life and enjoyment of many class reunions. My last call on Clement at his office in Chicago was about two years ago, and at that time he was still a young-looking man, full of energy, and, as always, cordial and interested to know what the fellows were doing. For many years he had been in the financial business and was interested in several companies. We shall surely miss him — The Class has suffered another

loss in the death of one of our most distinguished architects, Charles W. Dickey of Honolulu, who died on April 25 in that city in his seventy-second year. He had been ill for a week with a heart ailment, but had apparently been in good health previous to that time. Dickey was born in Alameda, Calif., on July 6, 1871. When he was two years of age his parents, Charles H. Dickey and Mrs. Dickey moved to the Hawaiian Islands. Here his youth was spent until he returned to Oakland, Calif., to attend high school and thence M.I.T. At Technology he was prominent in the Class and was a member of the Chi Phi Fraternity. After graduation he returned to Oakland and practiced his profession there for 20 years. In Oakland he designed many of the city's leading business houses, schools, churches, hospitals, hotels, and residences. In 1924 he moved to Honolulu where he lived ever since. In 1899 he married Frances Green Kinney, who, with a daughter, Mrs. Earl M. Thacker, and two grandchildren, survives him. He also leaves a brother, Lyle A. Dickey, a judge in Lihue; two sisters, Mrs. James D. Dole of San Francisco and Mrs. Arthur Merrill of Oakland; and a nephew, William Merrill, who has been associated with his uncle in the architectural business. Dickey's grandfathers were both men of note. One of them, T. Lyle Dickey was chief justice of the Illinois Supreme Court; and William P. Alexander was one of Hawaii's pioneer American missionaries.

The Honolulu *Advertiser* of Sunday, April 26, stated that in the 18 years of residence in Honolulu Dickey designed some of the most imposing structures in the Territory, and the inscription "C. W. Dickey, Architect" is seen on the cornerstones of many of Hawaii's most important business buildings and residences. From the following account in the newspaper mentioned, it will be seen that both professionally and as a citizen he was held in high esteem: "He designed the Farrington high school, Kamehameha boys' school, Kodak Hawaii building, Waikiki theater building, Aala theater, Varsity theater, Hilo theater, Halekulani hotel, Naniloa hotel in Hilo, Kona inn, the Alexander & Baldwin building, Castle & Cooke building. He also designed numerous buildings for the navy at Pearl Harbor and one of his assignments was designing the navy's new 1,000 bed hospital near Aiea. Other buildings whose blueprints bear Mr. Dickey's signature include Montague hall at Punahou school, the Wilcox memorial hospital at Lihue, Kauai, and the Kula Sanatorium on Maui. Some of Honolulu's first residences are products of Mr. Dickey's skill. These include those of George Vanderbilt and Paul I. Fagan. He was associated with other architects as chief architect for the Kamehameha Homes and Mayor Wright Homes low rent housing projects and was an associate designer of the Honolulu city hall and the Central fire station. A man of wide interests and a deep sense of civic responsibility, Mr. Dickey was a member of the Honolulu Chamber of Commerce, the American

Institute of Architects, the Engineering Association of Hawaii, the Pacific club and the Pearl Harbor Yacht club. He also was a Mason and a Shriner. He was president of the Hawaii chapter, American Institute of Architects, in 1937, and has been the president or an officer of virtually all of the organizations with which he has been affiliated."

A recent letter from Raymond Price told of a long motor trip which he and his wife took through Nevada, Utah, and Arizona in quest of the most desirable place of possible final residence, as Paris is no longer to be considered. The outcome was a return to the Price ranch at Los Alamos, Calif., and the conclusion that their own domain there is, as Ray expressed it, "one of the most satisfying regions of the whole world. So now we are settling down for our duration." Having been a student of world affairs for years, Ray foresaw the lack of preparedness and labored to bring it to the attention of those who should have been informed. The present situation is naturally one which is disturbing to his peace of mind, although he seems to believe that we shall again scrape through, but at a tremendous cost in life and effort, that might have been avoided if the nations had had wise, unselfish, and far-seeing leadership. We hope that in spite of everything that has caused them so much sorrow, Price and his wife will find peace and have many happy years on their ranch. Next time the Secretary goes to California, if ever, he hopes to find them at home.

Charles Abbot has recently sent the Secretary a copy of the *Annals of the Astrophysical Observatory of the Smithsonian Institution*, a truly ponderous tome filled with highly scientific papers and reports. It is new evidence of the important place in our national scientific personnel taken by the modest man whom we all regard as '94's number one researcher. — Henry Edwards has moved from State College, N.M., to Brockport, N.Y., surely a reversal of the Horace Greeley advice. Recently quite by chance the Secretary met Walter Janvrin, who was with us in the Class for two or three years. Since he left Technology he has been practicing civil engineering in Boston and vicinity. The occasion of the meeting was the graduation exercises of the Lowell Institute School, known in our day as the Lowell Free Courses, which now is an important evening school for engineers. Walter, Jr., was the recipient of a certificate in mechanical engineering, having previously taken a certificate in electrical engineering. It was extremely pleasant to meet an old classmate under such happy conditions. — Two years to our fiftieth! — SAMUEL C. PRESCOTT, *Secretary*, Room 3-207, M.I.T., Cambridge, Mass.

#### 1896

At the time these notes are being written, the last of May, news is at a very low ebb. John McIlvaine, who is a retired teacher in Philadelphia spent the winter in Florida. He is now located at 288 Charlotte Street, Asheville, N.C.

Admiral Bakenhus, Vice-president of the American Institute of Consulting Engineers, in his official capacity is actively opposing what appears to be unjust provisions of a bill in Congress limiting the profit of engineers or architects on government construction projects to 6 per cent of the cost of making drawings and the actual running expenses of their office.

At the moment the Secretaries are canvassing some of the Boston members of the Class with the objective of having a '96 table on the occasion of Tech Night at the Pops held in Boston on Saturday, June 6.

According to the press, the University of Vermont will devote considerable attention to the art of camouflage during the summer. One phase of this will be under the department of geology, which is headed by Professor E. C. Jacobs, who is also state geologist. Jacobs' job will be to find abandoned mines and idle mineral deposits yielding manganite and various others and other material from which government chemists would extract colors.

Malcolm McGann, who has been representative of the United States Shipping Board in charge of terminal facilities at Boston since 1925, has been appointed port agent for the board's successor, the Maritime Commission, at Boston. In addition to his studies at M.I.T., McGann attended the University of Glasgow. He has been associated with this type of government work since 1919 and will continue to act as terminal superintendent in conjunction with his new duties. — CHARLES E. LOCKE, *Secretary*, Room 8-109, M.I.T., Cambridge, Mass. JOHN A. ROCKWELL, *Assistant Secretary*, 24 Garden Street, Cambridge, Mass.

#### 1898

On May 8 the local members of the Class had a get-together in the Silver Room of Walker Memorial. Those present were Elliott Barker, Arthur Blanchard, Ed Chapin, George Cottle, Fred Dawes, John Dodd, Bob Draper, Henry Richmond, Joe Riley, Ernest Russ, Tommy Thompson, and George Treat.

Bob Allyn wrote: "I am still fighting. Have one son in the Army. Sorry I can't be with you." A Chinese graduate student in the Course in Metallurgy at Technology, Alfred C. Wu '40, who was recently working in the foreign trade zone of the port of New York, met Bob, the deputy commissioner of the department of docks. Mr. Wu thought that Bob was very fine indeed.

Heber Hopkins replied to our notice as follows: "I am running my own business in the morning and until 2:30 P.M. Seven days a week, from three until eleven o'clock, I do defense work in a machine shop. All of the work goes to the Bethlehem Steel Company. The rest of the days I spend painting the house, mowing the lawn, doing chores around the place, and repairing the auto. At the moment I am working on a plan to make the day 48 hours long so that I can get more sleep. Sorry I cannot be with you."



Joe Sears, who lives in East Dennis, was unable to come to the meeting but wished to be remembered to all of the boys. — Walter Cleaveland left Boston last April to return to his former home at 2415 Overlook Road, Cleveland Heights, Ohio. His daughter, Margaret, is the wife of F. D. Wyss, a lieutenant in the Army Air Corps, who is with MacArthur in Australia. Joe's youngest boy is an ensign stationed at the Naval Air Station, Quonset Point, R.I.

Van Lansingh wrote: "Mighty sorry I couldn't make it but I had to be in Washington. I have an apartment there at the Sheraton Hotel, where I spend about three days a week. Our company (Molybdenum Corporation of America) is 100 per cent in war work." — B. A. Adams says he is a colonel in the Twenty-second Infantry of the Massachusetts State Guard, stationed in Springfield. — John Lambert is chief medical officer of civilian defense for Lowell, Mass., and has organized all the medical, nursing, and hospital resources in the city. — Ernest Russ now has an apartment next to the Fens at 1197 Boylston Street, Back Bay.

Charlie Wing sent his regrets at not being able to attend our gathering. He also sent an old French book that he had bought some time past, which showed some of the primitive cotton machinery of nearly two hundred years ago. The book is a sort of encyclopedia and was published in 1762 under the auspices of the King of France. It has beautifully drawn plates and descriptive material covering the arts and sciences. Our classmates were studying this book all evening. Later it was presented to William N. Seaver, Institute Librarian, who recognized the very rare and valuable book and with enthusiasm accepted it for the Institute Library.

George Cottle is a little sensitive that he may show his very fine pictures too often at our class gatherings, and he needed some urging to present the interesting colored moving pictures of his recent trip to Florida, the Gulf Coast, and Texas. Again he displayed in his photography the skill and judgment of a real artist. Also highly appreciated were his reels of pictures covering Java, Bali, Burma, and Hong Kong, including many scenes of recent important events.

At the get-together we discussed our approaching forty-fifth reunion in 1943 and agreed that a committee under the chairmanship of Ernest Russ should determine the advisability of holding the usual type of event. All agreed that we should at least hold a dinner at the time of Alumni Day.

We received a letter from Arthur I. Franklin, 406 Guaranty Building, Indianapolis, Ind., who has been successful in the insurance business since early in the depression. He said that insurance had always been his hobby, even when chemistry was his vocation.

A clipping in the Pasadena *Star-News* of July 25, 1941, showed how Paul Johnson manages to keep young. Parts of the news report read as follows: "... Up from his summer home, Sagecliff, on the

Coast Royal, Capt. Paul Franklin Johnson of Altadena remarked today that he was increasing his two-year habit of daily walks and now was more than 400 miles ahead of his last year's record.

"So that these walks would not become monotonous," he said, "I have driven my car to some starting point and walked in that vicinity. I carry a map and check off the streets I have walked on. . . .

"I cannot walk as fast as when a youngster, but do a little better than three miles an hour (about 3.5) on the level. The hills slow me up very considerably. Until October we are living at 'Sagecliff,' coming back to 'Sagemont,' Altadena, for a day or so about every fortnight. When we get settled back here I will finish up San Marino. In the meantime I will walk the highways between Laguna and San Diego, and take a few hikes on the Channel Islands when we go for a cruise the second week in August. Next year, I think I will take up golf again. I haven't played in about 15 years.'"

Clarence Goldsmith has moved from Chicago to Washington, D.C., where his address is Office of the Chief of Engineers, War Department. — We note that the address of Harvey L. Currier is now 81 Norfolk Avenue, Swampscott, Mass. For years he has been principal marine engineer of the United States Navy Department, New York Navy Yard, Brooklyn.

Very few women students went through four years and were graduated with '98, but at that time a host of women, many of them students in near-by schools, took special courses at the Institute, and a considerable number of them are listed by the Alumni Office as of the Class of '98. A surprisingly large number of these women have achieved such distinction that we are very glad to have them listed as members of our Class. Notices of their achievements have appeared from time to time in our class notes. We noted in the last issue the death of Isabel Bevier, and we now add a paragraph from the March 27 issue of *Science*: "Isabel Bevier, until her retirement with the title emeritus in 1922 professor of home economics and head of the department at the University of Illinois, died on March 17 in her eighty-second year."

We have also received notices of the death of S. Maria Elliott, 9 Charles Street, Boston, on March 16, and of Wendell W. Chase, IV, 324 Franklin Street, Cambridge, on March 31. — ARTHUR A. BLANCHARD, *Secretary*, Room 6-241, M.I.T., Cambridge, Mass.

## 1901

Our President Bob Williams reported on Alumni Day as follows: "It was a beautiful day, just like June. Mrs. Williams and I drove over in the afternoon and enjoyed watching the dinghies and the crew races. Although I did not see any of our '01 men, I felt the Class was represented, for the races were in honor of Allan Rowe, and in the sailing pavilion I saw on a bulletin board the names of

## THE TECHNOLOGY REVIEW

Lammot du Pont and Phil Moore among those who had each given a dinghy to Tech. The banquet in the evening was a fine one and was the largest ever held, for the entire graduating class was invited. I am sorry to have to say I was the only one of 'naughty one' present, but I had an enjoyable evening at the '02 table. Du Pont and Moore's names were in the list of hosts to the senior class and were printed on the program."

Wilford De Berard wrote the following: "A year ago I became city engineer of Chicago, where I had been a pen-pusher for the *Engineering News-Record* for some 31 years. My new work is extremely interesting — and taxing, for one old enough to have been a classmate of Langdon Pearse, Frederic Bass, and Phil Moore, all of whom pay me visits on occasion. The job of city engineer is not entirely unlike that of editor, except that I am constantly being interviewed instead of propounding the questions. We have under way a couple of the famed Chicago-type bascule bridges and the largest water filtration plan in the country — 320 million gallons a day. The structure is more than one-half completed, and unless priorities get too strenuous, next year will see it in operation. Any of you '01 men, don't fail to come my way, without a ring or a call, for the latchstring is on the outside just as it was in the old editorial days. I have three children. My married daughter says Sacramento, where she lives, is a most vulnerable spot because of its location at the confluence of two rivers. Maybe so. A son is building a waterworks in Centralia, an oil boom town in southern Illinois. He seems to be following my footsteps in the water field."

Our Vice-president, Phil Moore, is still first vice-president and treasurer of Poor and Company, Chicago, of which he was one of the organizers in 1906. The company is very largely concerned with the manufacture and sale of railway equipment. In addition to this, a malleable foundry at Hoopeston, Ill., carries on a jobbing business, and a drop forge at Canton, Ohio, is at present very busy working on material for the Ordnance Department. Two new grandchildren arrived during the year, bringing the total to three girls and one boy.

Russell Putnam is in charge of engineering for the Waterbury Clock Company, Waterbury, Conn. At present the company is involved in defense activities. He and his staff have been busy recently with plans for building a separate \$700,000 plant for this work. Russell said: "Ed Davis and I are the only representatives of '01 in Waterbury. We meet often at the University Club here."

As was mentioned in these notes in an early issue of *The Review* this year, about a year ago Ed Davis was lent for half time by the Scovill Manufacturing Company to the Connecticut state defense council. Since then he has been identified with air raid defense work, directing the state air raid warden school at Hartford in July, and organizing and directing the state school for industrial wardens at

1901 Continued

Trinity College in October. At the latter, some 200 concerns representing one fourth of a million employees sent 300 delegates for a three-day course of lectures. As an outcome of this, over 60 A.R.W. schools have been formed in the state, at many of which Ed has lectured. He is now director of industrial air raid defense for the state council.

We shall mention briefly some of our classmates who have been in touch with the Secretary recently. Charles Tufts is vice-president of the Allied Chemical and Dye Corporation in New York City, with general administrative duties. He maintains his residence in Syracuse, N.Y. Mansfield Estabrook has been with the tool branch of the War Production Board since February. With offices in Boston, his work is to increase machine-tool production in New England. His home is in New York City. Matthew Cushing lives in Saratoga, Wyo., and is in the cow business. That should be a good place to be and a good business to be in at this particular time. F. Ward Coburn lives in Birdsboro, Pa., and is vice-president of the E and G Brooke Iron Company, Birdsboro, and vice-president of the Richard Ore Company, Wharton, N.J. Austin Hyde is manager of the Beaver Chemical Works, Calco Chemical Company division, American Cyanamid Company, dyestuff manufacturers, Damascus, Va.

Frederic Freeman lives in Portland, Maine, and is president and treasurer of the New England Guild. Frank Holmes is with Machy Sales, Andale Company, and Dayton-Dowd Company. He resides in Swampscott, Mass. P. Freeman Goodwin, formerly a lieutenant colonel, Corps of Engineers, and later superintendent of construction, office of supervising architect, Treasury Department, is now retired and lives in Bedford, Mass. George Harris is in New York City. For some time he was associated with the Armstrong Rubber Company. Arthur Davis lives in Gloucester, Mass., and is president of the Frank E. Davis Fish Company there. Edward Beckwith lives in Garrison, N.Y. Fred Connolly is retired and lives in Dorchester, Mass. For 23 years he taught pharmaceutical chemistry, toxicology, and pharmaceutical arithmetic at Franklin Union, Boston. Charles Anderson, a retired lieutenant commander in the Civil Engineer Corps of the Navy, makes his home in San Francisco. Charles Bittinger lives in Washington, D.C., and is a lieutenant commander in the Bureau of Ships of the Navy Department, Washington, D.C. Theodore Baldwin, a retired colonel in the Army Air Corps, was stationed in Texas. He now resides in New York City. — GUY C. PETERSON, *Secretary*, 788 Riverside Drive, New York, N.Y., THEODORE H. TAFT, *Assistant Secretary*, Room 3-266, M.I.T., Cambridge, Mass.

## 1902

Our fortieth reunion has had to be postponed until the end of the war. I say postponed as there is no reason why a reunion cannot be held before 1947, if other conditions permit. No general notice regarding the reunion was sent except to

those from whom returned post cards had been received, but the information was spread by different groups and gatherings. One such gathering was the Alumni Banquet on April 25, where seven of the Class — Hunter, Bassett, Lewis Moore, Adrian Sawyer, Ned Baker, Williams, and your Secretary — were present. — As our Class had lost its Treasurer through the death of Frank Montgomery, a meeting of the executive committee was held in New York on May 12 to fill the position. George Seabury is our new Treasurer.

In a letter received by Adrian Sawyer from Milton Dunham, now at La Sierra de Abangaros, Costa Rica, Dunham gave the following news of himself: "As the owners of the mine which we have been leasing decided to sell it, I am now busy-ing myself with my cattle farms, where I should be pleased to see any classmates who happen to be in this part of the world, if they wouldn't mind really roughing it and are not particular about their food." Possibly some of our traveling members will take up the offer. — From the Alumni Office we learned of several changes of address. Currey is now at 1514 Judson Avenue, Evanston, Ill. Julius Alsberg has changed his address to 2515 K Street, Northwest, Washington, D.C., and George Eagar is now at Old Forge, N.Y. Another address given is that of Mabel T. Wellman, 507 East 7th Street, Bloomington, Ind., who has been lost from the class records for some time. — Word has been received of the death on March 28 of James McFarlan Baker, IV, at Litchfield, Conn. Baker had not been able to practice his profession for several years because of ill health but always took a keen interest in class affairs.

The May issue of *Mining and Metallurgy* was devoted almost entirely to Cates's new open-pit copper mining development at Morenci, Ariz. The application of modern methods of mining and reduction of the ores makes possible the profitable working of these formerly worthless low-grade deposits. Probably ore containing about 1 per cent of copper can be worked in such quantities as to yield about seventy-five thousand tons of the metal annually. — A letter from Les Hammond told me that he had just completed the East River Drive. Marvin wrote that he occasionally sees Annett, Frank Robbins, and Farley Gannett. — BURTON G. PHILBRICK, *Secretary*, 246 Stuart Street, Boston, Mass.

## 1905

Because of letters received during the past three months and opinions expressed by a number of the Boston group, including those at the Alumni Banquet, we have decided not to hold a reunion in 1942. This decision was rather fortunate in view of the gasoline shortage and rationing which has since been imposed. "Let's do it in 1943 if the war is over," was the common suggestion. Here's hoping we can. At the Alumni Banquet we had a goodly representation — Babcock, McLean, Shapira, Strickland, Gammons, Buff, Charlesworth, Smart, and the Sec-

retary. Chesterman and Harvey were held up en route — Frank in New York and Pete "way out West," where his plane was grounded. Nevertheless, Pete's office assistant, of the Class of '17, visited our table, and insisted that we drink a toast to Pete, to M.I.T., and to 1917. The usual warm-up party in Pete's room was missed, and Shapira reports that he and Buff could not get served at the cocktail bar as the waiter thought them minors. Charlesworth passed along an '05 table reservation for a dinner on April 16 at the M.I.T. Club of Northern New Jersey. W. A. Taylor, P. G. Hill, and Bill Spalding had signed the reservation and wished to be remembered to classmates.

The grandfather club rivalry still produces news, probably because grandpas have little else to brag about. Here's a "beaur" from Grafton B. Perkins: "The Perkins Grandchild Company has recently stepped up its output by 33½ per cent, our second (Pittsburgh) unit having gotten into production. The local manager expects to roll this first model off the line, ready for market, in the spring of 1961. The model has been approved generally by experts who have examined it. The body is admittedly still a little small, sound effects are poorly controlled, and the whole job leaks badly. But the Pittsburgh factory superintendent says these defects will be eliminated as development work progresses. In fact the whole Pittsburgh staff, as well as headquarters in Boston, are most enthusiastic about the design. Early surveys show women are more interested in this new Pittsburgh line than men, but it is felt that with the necessary increase in size and altered trim, it will find its true market among the men." Grafton, you know, is advertising manager for Lever Brothers Company, Cambridge, Mass., manufacturers of Lux, Lifebuoy, Swan, and other soaps. He is being credited with the recent remarkable ads, radio programs, billboards, and so forth, in the popularization of Swan soap. Andy Fisher came in to tell us his second granddaughter, born in February, brings him up to Crowell in this respect.

Failure of our correspondence to get through naval red tape brought the following response from the wife of Clayton M. Simmers, XIII-A: "Both of your communications were finally forwarded to Captain Simmers, but I wish to explain that he has not seen either of them. I have tried to take over his personal correspondence, for the past months have been very busy ones officially. My husband works long hours seven days a week. Captain Simmers was on duty for seven years at the shipbuilding division of the Bethlehem Steel Company, Quincy, Mass., and our residence was at Longwood Towers. Last July my husband was transferred to the Third Naval District, New York City, where he was officially known as district material officer, with headquarters at 90 Church Street, New York City. Our family consists of two sons and a daughter — all married. These three families have given us five



1905 Continued

grandchildren, three grandsons and two granddaughters. Our older son, C. R. Simmers, a lieutenant in the Navy, was graduated from the United States Naval Academy in the class of 1932. Our second son, R. W. Simmers, was graduated from Princeton University in the same year. Our daughter, Sylvia Simmers Englund, was educated at Packer Collegiate Institute, Brooklyn, from which she was graduated in 1934. Sylvia's husband, Harry W. Englund '35, a graduate in the Naval Construction Course, is a lieutenant commander in the Navy."

From the *Aero Digest* we learned the following: "The Southeast Training Command, Maxwell Field, Alabama, has completed negotiations with Mr. E. W. Wiggins, treasurer and founder of the E. W. Wiggins Airways, Inc., Providence, R.I., and Mr. Wesley H. Marden president and treasurer of Airways Inc. Waterville, Maine, to build and operate an elementary Army Civil Contract training school at Camden, Arkansas. This center will comprise a new fully equipped central airport and three auxiliary landing fields capable of housing and training 500 students every nine weeks. Camden is located in one of the most beautiful sections of Arkansas and is considered one of the most progressive cities in that region. The Wiggins-Marden Aero Corporation, a new company, was incorporated in the state of Rhode Island and E. W. Wiggins was named treasurer and general manager and Wesley H. Marden was elected president and director. In selecting the Wiggins-Marden combination the Training Command has drawn upon the resources of two of the country's outstanding fixed-base operators. E. W. Wiggins Airways, Inc., founded in 1930, has long been reputed the nation's largest fixed-base operator. Located in New England, Wiggins has owned and operated more than 120 airplanes at one time, employing more than 200 people at its six bases. Its equipment has included three twin-motored Beechcrafts, twin-motored Cessnas and Grummans as well as many types of small craft. A 'High-Hat' member of the Piper Cub distributing organization Wiggins also represents Waco, Beechcraft, Cessna, and Stinson. This corporation's activities include CAA Approved advanced flying schools, CAA Approved Mechanic schools, and approvals in conjunction with many New England universities among which are M.I.T., Northeastern, Harvard, Boston College, Brown, R.I. State, and others. CPT Training in elementary, secondary, cross-country, and instructor courses are currently being conducted. Although mobilizing its resources for an all-out war training effort, Wiggins' New England bases have been streamlined to 'carry on' for the duration and will be ready for the post-war return to normal business."

From Grove Marcy we learned that his son Oliver was recently appointed vice-consul to Bolivia and with his bride has taken up residence at La Paz. Grove is contributing to the solution of war problems by raising lots of honey at his farm in Franklin, N.H. Bill Spalding wrote

that he spent March in the dust storms of Texas. He is still with the American Cyanamid Company, trying to double output. Bill's two sons are in the service, one at Fort Monmouth, the other studying at California Institute of Technology as an aviation cadet. Ben Lindsey, III, has moved to Philadelphia and is still with the United States Securities and Exchange Commission. Hallet R. Robbins, I, has moved from California to 2313 North Albemarle Street, Arlington, Va. Robert S. Beard, I, is now a lieutenant colonel, as is John C. Damon, VI. Sidney T. Strickland, IV, is again chairman of the Massachusetts State Board of Housing. — FRED W. GOLDTHWAIT, Secretary, 274 Franklin Street, Boston, Mass. SIDNEY T. STRICKLAND, Assistant Secretary, 137 Newbury Street, Boston, Mass.

## 1906

Fourteen members of the Class attended the Alumni Banquet at the Hotel Statler on April 25. They were the following: W. G. Abbott, Herbert Ball, H. W. Brown, Sherman Chase, Walter Clifford, Henry Darling, T. L. Hinckley, Bob Lyons, W. N. Messenger, Cupid Nash, H. R. Philbrick, Ned Rowe, Abe Sherman, and the Secretary. This group was a very satisfactory representation. We had two tables in the balcony opposite the speakers' table. This proved to be an excellent location, and everyone seemed to have a good time. The innovation of inviting Alumni Hosts to contribute toward tickets for members of the graduating class was responded to by 11 of our classmates. By this means, Bent, Blackwell, Coes, Hubbell, and Santry were represented by a member of the Class of '42. Brown, Darling, Hinckley, Lyons, Philbrick, and Sherman, who attended the dinner in person, were also hosts.

H. W. Brown, II, who is with the General Foods Corporation in New York, had a son in the graduating class. Young Brown was graduated from the Course in Naval Architecture and Marine Engineering and is now at the Fore River shipyard of the Bethlehem Steel Company in Quincy, Mass. This yard is very busy building ships for Uncle Sam's Navy.

Our classmate Michael J. Ahern once again received publicity by being the recipient of an honorary degree at the recent Tufts College commencement. He received the degree of doctor of science. Father Ahern is head of the department of chemistry and geology at Weston College, and has achieved distinction in science as well as theology. Leonard Carmichael, President of Tufts, mentioned Ahern's work in the National Conference of Christians and Jews, remarking that he has an able understanding of both science and religion.

Classmates will be interested in a wedding announcement previously overlooked by the Secretary. Floid M. Fuller was married to Frances E. Tompkins in New York on January 4. — On June 3, Sherman Chase, who is one of the partners of Metcalf and Eddy, spoke before the Boston Society of Civil Engineers on "Investigation of Pollution in the Andros-

coggin River." — JAMES W. KIDDER, Secretary, Room 802, 50 Oliver Street, Boston, Mass. EDWARD B. ROWE, Assistant Secretary, 11 Cushing Road, Wellesley Hills, Mass.

## 1907

Did you see the long article, with large photograph, in *Life* magazine of May 18, entitled, "Land of the Seven Seas?" It is about Emory Scott Land, the rear admiral, who is chairman of the Maritime Commission, War Shipping Administrator, and United States representative on the Combined Shipping Adjustment Board. He is affiliated with our Class, having received a master of science degree in Course XIII-A.

Alfred A. Brooks, II, has been a thermodynamic engineer all the years with the same firm, Moore Steam Turbine Corporation in Wellsville, N.Y., which has been purchased during the last five years by Worthington Pump and Machinery Corporation.

Alfred has a daughter, Mrs. George Pavuk, whose husband is resident inspector of naval material at Niagara Falls, N.Y., and a son, Alfred, Jr., who is in the class of '43 at Hobart College. The family home is at 309 West State Street, Wellsville. — Clifton N. Draper, V, was a chemist with the United States Geological Survey from 1908 to 1909, with United Gas Improvement Company for a year, and with United States Department of Agriculture for two years. Then, having attended Georgetown University from 1910 to 1912, he became a patent attorney with the General Electric Company of Schenectady, N.Y. In 1919 he was made supervisor of stock and in 1922 assistant production manager for this firm. From the spring of 1927 until the winter in 1942, Clif was president of Litho Craft, Inc., but he is now back with General Electric Company as turbine production supervisor. The home of Clif and his wife and 23-year-old daughter, who finished school in June, 1941, having attended the Chamberlain School in Boston, is at 1046 Ardsley Road, Schenectady, N.Y.

Since 1911 Roger Gale has been with the Sanford Mills, manufacturers of artificial leather and rubber-coated cloth, at Reading, Mass., as chief chemist for 24 years, superintendent for five years, and division manager since 1940. His married son, Richard, is with Perrin Seamans and Company, contractors supplies, Boston. — Phil Greenwood has also had a long connection with one organization, having been chief inspector with The Panama Canal at Washington from 1920 to 1936, and inspecting engineer there since that time. His daughter, who received her bachelor of science degree in 1936 and a master of science in 1938 from the University of Maryland, majoring in botany, is now married to George C. Rickard of Washington, D.C. His son Orville got his bachelor of science degree in mechanical engineering at the same university in 1940, is married, and is with the Glenn L. Martin Company at Middle River, near Baltimore, Md. Phil's office is at 1435 K Street, Northwest, Washington, and

1907 Continued

his home is at 8 Barney Street, Brentwood, Md.

James Garratt's location has been the same for a long time — 40 Sylvan Place, Nutley, N.J., his home; and 101 City Hall Annex, Newark, N.J., his office, where he is designing engineer, division of water, department of public works, of the city of Newark. He has done an outstanding job in the reconditioning of large steel water mains by cleaning and lining with cement mortar or bituminous enamel. Jim is active in the affairs of the Congregational Church in Nutley and in Boy Scout work, also in various engineering clubs and societies. His sons, Richard and John, have both been graduated, in electrical engineering and civil engineering, respectively, from Newark College of Engineering, the institution of which Allan Cullimore is president. Richard is with an electrical firm in New York City, and John, who has been in Houston, Texas, is now a lieutenant in the Sanitary Corps, 25th Station Hospital, Fort Bragg, N.C. His daughter Margaret is a junior at New Jersey College for Women.

Since being graduated from the Institute in 1908 (having been out during part of our sophomore year because of illness), Wheaton Griffin has been with Griffin and Hoxie, wholesale grocers in Utica, N.Y., and a member of the firm since 1922. He is a director of the New York State Wholesale Grocers Association, a member of the board of Utica Fire Insurance Company, of Faxton Hospital, of Home for Homeless of the Salvation Army, director of the Hospital Plan, Inc., an elder in the First Presbyterian Church of Utica, and member of several clubs. His daughter Elida, Vassar '32, is on the editorial staff of *Fortune* magazine in New York City, and his son Frederick, Hamilton '37, is a salesman for Griffin and Hoxie, married, and living in Utica. Griff wrote in May: "Greetings to my old '07 friends. I haven't seen you for many long years, but I am a sentimental fellow and '07 memories are very dear to me. What would I give if I could once again play the cymbals in an old '07 band at the armory on a Wednesday afternoon!"

Ralph H. Hall, II, living at 49 Francis Avenue, North Newington, Conn., has for many years been co-ordinator in apprentice training at the State Trade School (State Board of Education) at 110 Washington Street, Hartford, Conn. This school is a part-time extension program, attended by regular apprentices, machinists and toolmakers, whose related work is made to suit the individual to the job. The attendance has been as high as 300. — Earl Reed, IV, who for many years has had his office in the Tribune Tower in Chicago, is now installed, with Pierre Blouke '19, in a new office in the lower portion of a fine old house on the north side of Chicago, 1835 North Orleans Street, where he and his family live upstairs. Earl attended l'Ecole des Beaux Arts in Paris from 1909 to 1913 and has privately practiced architecture all his life. During recent years he has been district officer of Historical American

Buildings Survey of northern Illinois, has been city planning consultant for the Chicago Planning Commission on Woodlawn Conservation in that city, and has remodeled the Frances Willard Memorial Library in Evanston, Ill. He has two daughters, Dorothy and Joanne, ages 22 and 20, whose mother died in 1934. He married again in 1940 and had a daughter Linda, born late in April. Earl commented: "How about Linda as a notable achievement?"

Edward H. Sargent is chief engineer, Hudson River Regulating District, in charge of the design, construction, and operation of storage reservoirs, among these being the \$12,000,000 project, the Sacandaga reservoir for the regulation of Hudson River for power and flood control. Ed also carries on a general practice as a consulting engineer. He has a daughter, Mrs. Richard B. Parkhurst, Mount Holyoke '32, of Gloversville, N.Y., and a son, Edward H. Sargent, Jr., Cornell '39, of East Orange, N.J. His office is at 11 North Pearl Street, Albany, N.Y., and his home at 302 Washington Avenue in that city. — By the time these notes appear, the Secretary and his wife will be living at a new address, 23 Leland Road, Whitinsville, Mass. He is no longer working under the direction of Phil Walker, but has new duties in connection with a large defense project at the Whittin Machine Works. His older daughter became the mother of a second son on May 20, so that now four of our children are married, and there are three grandchildren. — BRYANT NICHOLS, *Secretary*, 23 Leland Road, Whitinsville, Mass., HAROLD S. WILSON, *Assistant Secretary*, Commonwealth Shoe and Leather Company, Whitman, Mass.

## 1908

At the March bimonthly dinner, plans for the usual May dinner were given up, and we decided to put all our energies into getting a good crowd for the Alumni Banquet, which had been advanced to April 25 to correspond with the early wartime commencement. The following members of '08 were present at the banquet: George Belcher, George Glover, Pop Gerrish, Toot Ellis, Frank Towle, Henry Sewell, Harry Lord, Ted Joy, Bill MacAuliffe, Myron Davis, Linc Mayo, Cookie, and Nick Carter. — Don't forget that we celebrate our thirty-fifth next spring. George Glover who was on from Lima, Ohio, is beginning missionary work in the Midwest for the reunion.

Classmates will be sorry to hear of the death of Thomas Esten, son of Paul Esten, which occurred on April 30 in Alexandria, Egypt. He had been a volunteer ambulance driver with the American Field Service and had been awarded the *Croix de guerre* for bravery in action on the French front. — We announce with regret the death of Aram Torossian which occurred in Berkeley, Calif., on December 6. He had been professor of architecture at the University of California since 1922. — Betsey Balch of Hingham, Mass., will be the bride of Frederic B. Cole, son of Herbert A. Cole, Jr., and Mrs. Cole.

We have the following changes of address to report: G. William Bailey, 443 Wyoming Avenue, Millburn, N.J.; Maurice L. Bullard, 136 Liberty Street, New York, N.Y.; Abraham S. Cohen, Room 1107, 101 Tremont Street, Boston, Mass.; Allston Dana, 319 East 50th Street, New York, N.Y.; Alexander M. Emerson, 85 Kensington Road, Bronxville, N.Y.; John H. Locke, 340 Fishers Road, Bryn Mawr, Pa.; Walter E. Poor, Hygrade Sylvania Corporation, 500 Fifth Avenue, New York, N.Y.; Leland E. Wemple, Southwestern Mineral Company, Duncan, Ariz. — H. LESTON CARTER, *Secretary*, 60 Batterymarch, Boston, Mass.

## 1909

Arthur Morrill's brother, Fred '07, has sent in copies of letters that have been received from Arthur, who on December 8, the day after Pearl Harbor, wrote from Lashio, which is situated at the beginning of the Burma Road. Arthur went to China with the American Medical Commission to advise our Chinese allies on camp sanitation. On November 11, he left San Francisco by air for Singapore and late in November started for Rangoon and arrived in Lashio. At last accounts Arthur was in China, "deep in the heart of Yunnan," and all of us wish him well in his hazardous undertaking. Here are some interesting paragraphs from his letters: "Just this morning [December 8] at about 8:15 A.M. we first heard that the United States and Japan were at war. At seven-thirty someone heard the news on the radio and carried the word to the hostel, from where it was brought to us. We were intensely interested and, of course, concerned. When we heard that the Japs had been bombing Honolulu, Guam, Manila, and Singapore, we wondered whether they had any attention to spare for Lashio. We were glad that the weather was as foggy and rainy as is customary. During the day, the weather has cleared off and things have gone on much as usual. I have only the things I took with me from Detroit [where Arthur lives], and most of the commission's camping equipment has not yet come. . . .

"Some of the men left Saturday for the nearest division of the work, which is to be done at the same place I went about a week ago. The railway people have built a number of rather good buildings with bamboo mat walls and wire screens. Our men can stay in one of these. Beds are there, but they had to take bedding, food, and one or two little kerosene cookstoves. The road back to Lashio is good except for the first mile. This is beautiful country and the climate is ideal, at least at this season of the year. We sleep under two blankets, but the days are sunny and warm. [Lashio is in the same latitude as Havana, Cuba.] By noon the weather is too warm to wear a flannel shirt, even without a coat. Early in the morning we are in the clouds or just under them, but they usually clear away by about nine o'clock.

"The time is only 6:45 A.M., and I am going to get a little written before break-



1909 Continued

fast. This morning [December 12] is rather foggy but not cold. We have been preparing for the last few days for a trip well into China over the Burma Road. Where we shall go is not quite certain, but we have been stocking up on provisions and camp supplies and expect to start tomorrow at 7:00 A.M. Since most of our camping equipment has not yet arrived from America, I did a lot of shopping yesterday and the day before, both on the commission's account and on my own. Much of the commission's buying is done on credit, by having charge accounts with the Burma Oil Company and several of the Indian stores. The storekeepers seem to be used to that way of doing business and ask in imperfect English if you wish to "sign only," which means signing the sales slip, taking the goods, and paying the bill later. I bought blankets, sheets, pillows, camp cots, and a heavy auto-cloth cover to wrap up my own bedding roll. The commission pays for camping equipment, and each man pays for his food.

"At 7:21 P.M. [December 14] we came into the yard of the Rockefeller Foundation house at Chefang, about 30 miles inside China on the Burma Road. The house looked especially attractive because we had been driving in the dark for an hour and a half, and for a while we had visions of spending the night out in the mountains. Today we came from Lashio, which is about 140 miles away. We had intended to start about eight o'clock but thanks to a flat tire it was ten before we finally passed the police barrier at Old Lashio. There are many formalities in getting out of Burma and into China, and none of our cars had Chinese license plates. An hour and a half passed between the time we entered Kyohkok, the first town in the Burmese Shan States, and the time we left Wanting, the Chinese town on the other side of a small creek. The road was quite good nearly all the way today. What we have is said to be a boulevard compared with what is to come. The asphalt-treated part is about 10 or 12 feet wide, but the shoulders are generally smooth and high enough so that there is little difficulty in swinging out on them in order to pass a truck. The smooth surface was 25 to 30 feet wide.

"I drove for one-third of the way and part of the time could go 30 to 35 miles an hour without much discomfort to the men in the back seat, but some of the rest of the trip was quite different. We climbed up and twisted down mountains, wound continuously in and out of ravines until we reached the top of the pass, and then continuously went down. When, in the midst of a long climb, we came to a stretch not quite so steep, the effect was of going downhill.

"Now at 6:00 P.M. [December 15] I am at Lungling. In the early darkness both sides of the street are lined with battered and dusty trucks. We have been riding the real Burma Road today, and the ride has been a bumpy one. The central strip about 8 feet wide is of rough stones or pebbles 4 to 6 inches in diameter and none too smoothly laid. No tar is on

this part of the road and all the fine material, if there ever was any, has been ground up by the traffic and washed or blown away. On each side of the rock strip is a shoulder about 8 feet wide, of dusty clay and gravel. Though rough and uncomfortable, the road is one of the wonders of the world. I did no driving today, but if I had, I should not have cared to look down on some of the places we passed. Lungling is over 5,000 feet above sea level, and we have come up about 3,000 feet in the 24 miles since midafternoon. Part of the way this afternoon, the road ran up a gorge not far above the rushing stream at the bottom. This part of Yunnan is more heavily populated and has terraced rice fields for a long way along the stream. After a while we crossed the stream on a bridge and then started climbing, winding into each ravine and then back out again, nearly always up a steep grade. Since we came into China, the mountains have been covered with grass or low vegetation but not with trees. Apparently they have been cleared in order to get wood or for purposes of cultivation.

"Now we are at the Grand Nan Yang Hotel at Paoshan, the first walled city we have reached in China. I think the population is twenty or thirty thousand, and this 'hotel' is a great improvement over that at Lungling. In some ways I have seen more of China in the last three days than in the three years I lived here before. Most of the time I have been eating Chinese food with chopsticks, and to the aesthetic and sanitary distress of one of our party, everybody dips into the common dish. Today we crossed the magnificent gorge of the Salween River, which is simply unbelievable. I drove the first 35 miles this morning, and at many places if our car had gone over the bank, it would never have stopped rolling till it reached the stream bed, several hundred feet below. The difficulty in driving the road is all psychological. In most places the roads are wider than many of those in Michigan, and there is no gravel to roll under your tires. The way is often very steep, up or down, but not slippery. Today we drove more in low and second speeds than in high. Generally the mountain slopes were about 40 degrees, with a horizontal which is what my wife would call 'straight up.' If you toss a rock on such a slope, it just keeps going. No road can be built on such an incline, so to get down into the gorge and up again, the road must take long zigzags back and forth, winding around knobs, through saddles, in and out of ravines, and over little bridges, to get the necessary elevation without an impossibly steep grade."

The last letter from Morrill's brother, written at Kunglang in Yunnan Province, was dated February 14, the day before the Chinese New Year, a day that can be called the biggest holiday of the year. Our best wishes go with him. — CHARLES R. MAIN, *Secretary*, 201 Devonshire Street, Boston, Mass. *Assistant Secretaries*: PAUL M. WISWALL, MAURICE R. SCHARFF, New York; GEORGE E. WALLIS, Chicago.

## 1910

Again the Class is contributing its quota of men to the armed forces for the duration of the war. Harold W. Churchill is a colonel and is stationed at the Raritan Arsenal, Metuchen, N.J. Van Court Warren at Pismo Beach, Calif., and Richard Jacobs in Washington, D.C., are lieutenant colonels. Andrew Fabens is a major stationed at Evansville, Ind.

M. J. Turnbull sent your Secretary the following news clipping: "Manager for the American Munitions Division enterprise is J. Stuart Sneddon, an incisive, driving man who wasted no time. When Mr. Jones, the president, handed him the proposed contract, he immediately worked out even the most intricate details of staff organization, costs, schedules, office space, salaries. . . ."

Al Phillips mailed in an article from the New York *Herald Tribune* about the launching of four United States destroyers at the Kearny yards in New Jersey in 55 minutes. Without question, this historic shipbuilding event was made possible only by the greatest of co-operation and leadership. Much credit for this event should be given to Gordon Holbrook, general superintendent of the shipyard.

At the Alumni Banquet held on April 25, the five '10 men present were Charlie Greene, Bob Burnett, Jack Babcock, Luther Davis, and William Wallour. Your Secretary was unable to attend the enjoyable event as he was away on business. — HERBERT S. CLEVERDON, *Secretary*, 46 Cornhill, Boston, Mass.

## 1911

It is cheering to realize that '11 is again off to a fine start in this, the third year, of the Alumni Fund. Witness these statistics gleaned from the first official progress report from Fund headquarters: We have the best percentage of contributors among the last 44 classes to be graduated and stand seventh among all 75 classes. In amount contributed we are seventh of the last 35 classes and tenth among all classes. There is, however, one important phase of the Fund in which '11 does not hold its own — our average subscription is now \$14.08, whereas the average for the seven contemporaries (1908-1914 inclusive) is \$16.57 — so, particularly in this all-important year, that is where we can all help by increasing our individual subscriptions and remembering that such additions become directly deductible from taxable income. Think it over!

Our ranking service member, George Kenney, I, a major general in the Army Air Forces, has been transferred from Wright Field, Dayton, to the Presidio of San Francisco. Down in Washington, David S. Gaillard, VI, has been upped from lieutenant colonel to colonel. He and Carl Richmond, I, a lieutenant colonel, are both in the Office of the Undersecretary of War in Washington. Pete is heading the ordnance section production branch, and Carl, the engineers' technical service branch.

Here in Worcester, Harold Robinson, I, has been commissioned a captain in the

1911 Continued

Air Corps Reserve and left on May 2 for active duty, reporting at the Miami, Fla., training station. Six days later at Jacksonville, Fla., a Worcester youth, Orville B. Denison, Jr., Bowdoin '41, an ensign, received his wings in the Naval Reserve and headed north for a home furlough. Commenting on Robbie's departure, the Worcester *Gazette* said: "Capt. Robinson served as secretary to the Worcester Planning Board and was a member of the Lincoln Square Commission. He was graduated from M.I.T. in 1911 and was a member of the State Guard in the first World War. For many years he has maintained an office at 22 Elm Street. It will be closed during his military service." Ye Sec's big son reported for active duty at Norfolk, Va., on April 28.

Despite the fact that when Java fell his income ceased, our tapioca king, W. J. Seligman, III, cheerfully sent along his Fund subscription, although he added: "I may have to wait until after the war to collect what is due me as of the date Java was invaded." — Did you happen to listen to "We the People" on Columbia Broadcasting System stations Sunday evening, May 3? If you did, you heard the radio debut of Bill Coburn, I, and his wife, who told of the success of their Chestnut Hill "scrap tease" party to aid the salvage for victory campaign. O. B. Denison, VI, was re-elected secretary of the New England Chapter, Hotel Sales Managers' Association, at the annual meeting on April 30, in connection with the New England Hotel Show at the Hotel Statler in Boston. Another third term!

Several nice letters came in, including one from a hitherto lost sheep, C. L. Hufsmith, VI, President of the First National Bank, Palestine, Texas. Pop wrote: "Here's hoping it won't be long until we have some news which will warrant an enthusiastic bunch of hand-clapping (like the clap-clap-clap in "Deep in the Heart of Texas"). So far the most of what we have been receiving down here has been bad." He enclosed a page from an early May edition of the Palestine *Herald*, which carried his picture — looking quite natural, despite his baldness — with a story of the celebration of the fifty-fifth birthday of the bank he now heads. The story said that Palestine's drive for China relief, under Pop's direction, was 160 per cent oversubscribed, having reached \$2,631. The original goal was \$1,000. Nice going, Pop!

A. T. Cushing, I, United States Department of Agriculture official with headquarters in Kansas City, Mo., wrote from Detroit: "I am now in this Michigan metropolis for about a month, appraising the Detroit stockyard for the government. The appraisal is for rate-making purposes. My daughter, Emma Mae, a junior at Drury College, Springfield, Mo., has been elected editor and publicity director for her sorority, Kappa Delta. Son Don, who in April accepted his first job as assistant in the General Testing Laboratories in Kansas City, is to take charge of all physical testing during a month's absence of the man in charge."

From 660 Longwood Drive, Northwest, Atlanta, Ga., Louis Grandgent, IV, wrote: "A large group of us in the United States Housing Authority have been moved to the southeastern regional office in Atlanta, Ga. We were escaping from congestion in Washington but we seemed to jump from frying pan to fire. It took several weeks for us to find houses that were to our liking, for there has been a general influx at Atlanta. Vacancies are lacking, but not houses. This city has an amazing abundance of lovely residential sections. Varied topography and flowering trees combine with high quality in the design of the houses to produce endless interest as you drive around — a pastime now belonging to the past, since gasoline has been rationed. The activities of our agency are now devoted to production of war housing, under high pressure and in great volume. Restrictions on the use of critical materials and limitations on availability of utility services in various localities make the business of planning more exciting than ever." Thanks, Louis, for a grand letter.

With characteristic modesty, Ed Woodward, VI, western mechanical editor of *Railway Age*, with an office at 105 West Adams Street, Chicago, prefaced his mid-May letter with the following: "The only trouble with writing to you, Dennie, is that whatever we say is grist for the mill." Fear not, Ed, I try to use editorial discretion and in your case here's what came out: "My older daughter, who is a junior at Knox College, specializing in language and music, recently gave a vocal recital and received some excellent press notices.

"In a business way, things are moving at an increased tempo in Chicago to conform to the war effort. I am endeavoring through work on the *Railway Age* staff to contribute in some small way to increased railway capacity and efficiency. Our current special issue, dated May 23 and entitled 'Freight Progress in War,' is designed to help the Office of Defense Transportation convince the War Production Board that more cars and locomotives will be needed if the railroads are to transport successfully the huge amount of war materials called for in the President's program, as well as to take care of civilian needs and the traffic diverted from highways and waterways.

"In addition to my other duties, I have been appointed civilian defense co-ordinator for the village of LaGrange Park, where I live, and if you know anything about this work you know that exacting demands are made on my time and organizing abilities. I should like to see you and the rest of my classmates in the New England territory more than I can say and wish you would extend my greetings and hearty good wishes to any you may meet. The old school ties draw us closer together as the years go by, and I certainly regret that we cannot see each other more often." The feeling is mutual, Ed.

Under the intriguing caption, "Thousand Owners of Small Boats Patrol Coast

Line," the Boston *Traveler* in late May told of the work being directed by Roy MacPherson, II, Framingham resident and former commodore of the Quincy Yacht Club, who holds a commission in the United States Coast Guard Reserve and last winter was called to active service. One of his principal assignments has been to organize and direct the Coast Guard Auxiliary, composed of private boat owners, to aid the regular Coast Guard in protecting the North Atlantic coast line.

"Serving without pay," the story said, "more than 1,000 small boat owners in this area have already joined the Coast Guard Auxiliary and are spending their nights and Sundays patrolling the coast in their own and Coast Guard craft. Directing the work of the volunteer auxiliary is Lieut.-Commander Roy G. MacPherson, a veteran yachtsman. Capable, thorough and a rigid disciplinarian, the auxiliary director is proud of the work his amateur navy is doing.

"'Ready When Called — that's our motto,' explained Comdr. MacPherson, 'and so far the group hasn't fallen down in an assignment. Some of the tasks are simple and some are tough, but the auxiliary has been able to come through.'

"Any male citizen over 18, who owns at least 25 per cent interest in any yacht or motorboat (16 feet or longer overall) is eligible. The applicant must have a thorough knowledge of: handling and operation of vessels, rules of the sea, buoyage system, navigation laws and the regulations of the auxiliary." More power to you, Roy!

Here are just a few new addresses received from the Register of Former Students: Warren B. Hopkins, V, 250 Beacon Street, Boston; Wesley T. Jones, II, 633 Whitney Avenue, Hamden, Conn.; Harry E. Lake, I, 46 Bogart Avenue, Port Washington, N.Y.; Laurence G. Odell, XIV, Apt. 8-C, 305 Riverside Drive, New York City, and Alexander W. Yereance, I, a captain in the office of the Engineer, First Corps Area, 50 Follen Street, Cambridge.

So we end another volume of '11 notes without having skipped an issue. However, remember we have no reunion this June, so "Write to Dennie" becomes the summer duty of each loyal '11 man. So do! — ORVILLE B. DENISON, *Secretary*, Chamber of Commerce, Worcester, Mass. JOHN A. HERLIHY, *Assistant Secretary*, 588 Riverside Avenue, Medford, Mass.

## 1914

In spite of its early date, Alumni Day found '14 ready to carry on as usual. We all missed the luncheon which in previous years has been such a pleasant part of the day, but we did our best to make up for it at the dinner. The usual predinner class meeting was held at the Hotel Statler, where we were joined by friends of the Class, including Bursar Rhind, Major Staff from Camp Edwards, Squire Swift, and William Jackson. Clarke Atwood presented a casein fiber hat to Dr. Compton as a token of modern science in which he has a part. Attending the dinner were



1914 Continued

Atwood; Covitt, whose son was graduated in the VI-A co-operative course, receiving both bachelor's and master's degrees; Charm, who came up from Newport; Crocker, who flew back from Chicago that day to arrive in time for the dinner; Devine; Fales; Gazarian; Bert Hadley; Hamilton; Tallman; Trufant; L. A. Wilson, whose son was a member of the graduating class; and your Secretary. Our honorary member, Professor Keyes, was also with us. A few nights later he was awarded the Theodore William Richard's Medal for 1942 at the northeastern section meeting of the American Chemical Society. Fiske, Mayo, Peaslee, and Shaw had made dinner reservations, but at the last minute were unable to come.

From Devine we learned of his work in the field of blackout and dimout, particularly as affecting the operation of motor vehicles, and from Trufant that he was stationed at the naval ammunition depot at Hingham. Tallman's son was also present for a short while. He is a member of the graduating class but because he is taking Course VI-A will not receive his degree until next year, when he will also get a master's degree. He receives a bachelor's degree from Williams College, where he studied before transferring to the Institute.

Walter Eberhard also had a son who was graduated this year. A second son is a member of the sophomore class. — A unique feature of this year's dinner was the invitation by Alumni to members of the graduating class. Thirteen '14 men were on the Committee of Alumni Hosts.

We missed Malcolm Mackenzie at the dinner. His absence broke a long record. Mac, who lives in Derry Village, N.H., wrote that in view of the tire situation, coming down just was not right. This situation should, however, help his wood-working business because his letterhead lists among other items "harness shafts."

The April issue of the *News*, published by Theta Delta Chi, carried an article about Les Snow under the caption, "Saga of Success." Besides being a vice-president of the Chase National Bank in New York, Les is president of the Theta Delta Chi Founders Corporation. The article also states that Les, who served as a major of ordnance in World War I, found his colonel's niece very attractive, and two years after the War they were married.

Last month it was reported that L. W. Burnham, a colonel of the Marines, had returned to Quantico, Va. But the Marines do not stay put for long, and word now comes that Burnham, in command of a marine unit, has left for foreign service. Alden Waitt, a colonel in the Chemical Warfare Service, who was mentioned last month, is now chief of plans and training division.

L. F. Hamilton is now the acting head of the Department of Chemistry at the Institute, in the absence of Professor Keyes who has been called to an important war assignment. — H. B. RICHMOND, *Secretary*, General Radio Company, 30 State Street, Cambridge, Mass. CHARLES P. FISKE, *Assistant Secretary*, 1775 Broadway, New York, N.Y.

## 1915

Of our Class, 65 contributors to the Alumni Fund have given \$1,661. We are far below our quota. We need an average contribution of \$15 from every single classmate. If you can't give \$15, give what you can. If you give more than \$15, the extra will help to offset the smaller contributions. My thanks and appreciation go to the few classmates who have already generously responded so promptly to the Fund.

In a good looking four-page folder, our own Bert Adams is described as a performer of magic and demonstrator of psychological deceptions for agile minds. The write-up is very interesting, and Bert's performances themselves, as we well know, are so fascinating and entertaining that he deserves much good business from this folder. — Carl T. Dunn, Vice-president of the Charles E. Bedaux Company of Illinois, got into print again in the May issue of *Illinois Journal of Commerce*, with a technical article on "More Production Through Co-operation." Apparently Carl is using his mental efforts to bolster war production.

At a recent board meeting of the United-Carr Fastener Corporation in Boston, Loring Hall was elected vice-president and director. Aside from this business honor, Loring became another class granddaddy! His son, Charles Loring Hall, Jr., and Mrs. Hall of Cambridge, had a daughter on April 13, thereby making Loring eligible for the company of the other oldsters of the Class who are now grandfathers — Weare Howlett and that gang!

Bill Campbell described his new position in the following interesting letter: "I was certainly glad to hear from you and to get the message from George Rooney. When I was home in Cincinnati a couple of weeks ago, I happened to notice one of the old books saying that George and I were together in the minstrel show at East Machias in the summer of 1913! A lot of water has gone over the dam since then. At the present time I am with the American Machine and Foundry Company in New York as vice-president of the American Machine Defense Corporation, and we are up to our necks in defense work. Also, I do a little work for the Quartermaster General's office in Washington each week just to be sure that I'm kept busy. I gave up my work as vice-president in charge of manufacturing in the Kroger Grocery and Baking Company in Cincinnati in order to do this present thing. Please give my best to all the old crowd when you see them. I hope I can get on to Boston now that I am closer to it. I'd like to take in some of the class dinners that I note from The Review are held every now and then." Our congratulations to Bill and best wishes for success. Bill has been one of the most loyal and generous supporters of everything connected with our Class and the Institute.

Another classmate has strayed from the straight and narrow path of engineering. Sam Berkowitz has a new hobby. He produced a show that bids fair to be

## THE TECHNOLOGY REVIEW

a Broadway hit — *Uncle Harry*, which opened in New York City in May with Joseph Schildkraut and Eva LeGallienne in the leading parts. The play was written by Professor Job of Carnegie Institute of Technology. I was in New York at the opening with Ralph Hart and other classmates, and judging from our own impressions and the many favorable newspaper reviews, it is a real smash hit. Good luck to Sam and his new hobby. If conditions are too tough after the war, Sam may be able to cast some of the old Technology show performers in our Class. Shades of *Castles in Spain*!

Some prep school sons of friends of Ralph Hart are interested in attending Technology. One night recently Ralph gave a movie party in his New York apartment for these boys and their parents. Charlie Locke '96, Alumni Secretary, lent him some colored movies of the Institute, and he pressed me into service as the commentator to read the script. The show was impressive, and I am sure the youngsters received an interesting and encouraging impression of Technology. Some of the Tech men present were: Ralph Hart, Sam Berkowitz, E. I. Birnbaum '30, S. M. Edelstein '32, Jules Friedman '27, and Morris Hart '21.

At the eighty-sixth commencement of Tufts College, Medford, Mass., Dr. Stanley H. Osborn, state commissioner of health in Connecticut, was awarded the honorary degree of doctor of science for application of medical science to public health problems. Congratulations to Stanley! — As president of the Massachusetts Engineering Company, North Quincy, Mass., Harry J. Murphy wrote: "Between government inspectors on workdays and poor golf on Sundays, my years are bearing down on me a bit." Don't give up, Harry. Try to keep up with the youthful spirit of '15. — A clipping from a Boston newspaper told us that Frank Herlihy has been appointed master of the Solomon Lewenberg intermediate district in Boston, one of the largest intermediate districts in the school system.

What an experience! Virgil Wardwell, in the service of the United Nations, under contract with the combined George A. Fuller Company and the Merritt-Chapman and Scott Corporation, which were engaged in the erection of wharf facilities in Northern Ireland, has just returned to his home in Stamford, Conn., after ten months on the west coast of Northern Ireland. A long article in the *Stamford Advocate* of May 22 described Virgil's exciting experiences and quoted him as saying he believes American troops in Northern Ireland may relieve the British of the job of guarding the Emerald Isle against invasion by the Nazis. — So ends this year's column, with my sincere wishes for you all to enjoy a happy, if gasless, summer. Be prepared in the fall with lots of interesting news to "help Azel." — AZEL W. MACK, *Secretary*, 40 St. Paul Street, Brookline, Mass.

## 1916

The Alumni Banquet at the Hotel Statler in Boston on April 25 found Harold

1916 Continued

Dodge, Shatswell Ober, Duke Wellington, Joe Minevitch, Tom Berrigan, Johnny Woods, Rusty White, Jack Hunneman, and Joe Fouhy sitting at the '16 table. Harold Dodge took his son Stuart to the banquet. Stuart plans to attend the Institute next year.

Bob Wilson has been appointed one of the four-man board of managing directors for the General Aniline and Film Corporation. The board was appointed by the United States Treasury Department for this foreign-owned company. — Henry Shepard, a lieutenant commander in the Naval Reserve, has given up his peacetime activities and represents the Navy through the War Production Board at 17 Court Street, Boston. Just how the golf ball and bowling ball business will get along without Hen is very much of a question. Uncle Sam's naval affairs, however, are sure to benefit by his attentions.

Joe Barker is still special assistant to the Assistant Secretary of the Navy, chasing all over the country contacting colleges and secondary schools in the interests of Navy personnel training. — Don't forget the M.I.T. Alumni Fund now in progress. Make your checks payable to the Massachusetts Institute of Technology, and mail them to Room 3-219. — JAMES A. BURBANK, *Secretary*, The Travelers Insurance Company, Hartford, Conn. STEVEN R. BERKE, *Associate Secretary*, Coleman Brothers Corporation, 245 State Street, Boston, Mass.

## 1917

Penn Brooks, as the '17 orator at the 1942 Class Day on April 25, discharged that pleasant though onerous responsibility with great distinction, and to the special delight of those of our Class who were present in the audience which crowded Morss Hall of Walker Memorial. Following these exercises, adjournment was taken to the Sailing Pavilion for the christening of the Lawley 110, presented as one of the '17 gifts. Al Lunn and Jack Wood ably assisted Dr. Compton in the ceremonial by which the craft was named the *Ford*, as a tribute to our honorary member, Horace S. Ford, to whom the occasion came as a surprise. He responded felicitously.

Twenty-six of the Class were present at the Alumni Banquet that evening at the Hotel Statler. They were Beaver, Ken Bell, Bernard, Blanchard, Bone, Penn Brooks, I. B. Crosby, Dennen, Erb, Gartner, Gurney, Hutchinson, A. K. Johnson, S. M. Lane, Lobdell, Loengard, Lunn, McGrady, Marsilius, Neumann, O'Brien, Solakian, R. Stevens, Strout, W. C. Wood, and E. M. Woodward.

Well-merited applause for the operation of this highly successful Alumni Day — the first to be self-supporting — was bestowed upon its chairman, Ray Blanchard. For three others, this year's Alumni Day had special significance: Dutch Neumann and Bill Dennen, now on active duty as a colonel of the Coast Artillery, each had a son being graduated the following Monday; and N. M. Marsilius' son was awarded a master's degree at the end of May.

At this writing a goodly percentage of our colleagues apparently anxious to resist the ravages of approaching senility are planning to gather at New London on June 19 to June 21. Ted Bernard beligerently continues to offer odds that our horoscope betokens an interference of the supernatural, but our genial chairman, Brother McNeill, preserves his executive imperturbability. Mac, having left Colgate-Palmolive-Peet Company for E. R. Squibb and Sons, is now in a position to dispense products which will appeal to all classmates. He would appreciate hearing from any readers of these notes who were unable to be present at New London, and who thus failed to obtain at least one of his small ration samples of aspirin tablets. Simply write to him at 165 Kent Place Boulevard, Summit, N.J., enclosing a plain self-addressed stamped envelope for reply. (N.B. The stamp is important.)

Appraisal of the merits and demerits of the New London program must necessarily await a later issue of *The Review*, but it is possible now to record sincere regret that so many will be unavoidably absent on account of the war. Chief among these are, of course, '17 men now known to be on active service with the armed forces, a total of 37 — 18 in the Navy and 18 in the Army, with Louis Perkins, a commander of the Coast Guard, holding a balance of power. Some of these, such as our erstwhile architectural compatriot (who also became high-jump champion through his own efforts plus those of Frank Kanaly), William A. Sullivan, a commander in the Navy who is now in charge of raising the *Normandie*, may be able to attend. And we have hopes that Potts Mehaffey will temporarily forsake his toy boats at the Navy's model basin in Washington long enough to show us the two and one-half stripes he sports. Maybe by the time he reaches New London he will have three full stripes, for one recalls Potts's ability to acquire extra insignia coincident with our reunions. But we know we shall miss Heggie, now a full colonel (we realize the possible inference which, though unintentional, is unfortunate) stationed in Hawaii; and Frank Conaty from whom we last had mail sent in late March, when his address was Corregidor.

We claim no class admiral as yet, but we do have a brigadier general; 7 captains in the Navy and 5 colonels in the Army; 9 commanders and 12 lieutenant colonels; and 3 lieutenant commanders. To name the man with a star first is consonant with regulations and military harmony. He is Forrest E. Williford, VI, of the Coast Artillery.

Five of the Navy captains included in the XIII-A detachment that we acquired via Annapolis were Frederick G. Crisp, Earle F. Enright, Everett L. R. Gayhart, Ernest M. Pace, and Harold E. Saunders. But we also have two captains who came up the hard way: W. Mack Angas, I, and Penn L. Carroll, VI.

To continue with the Navy, here are the commanders: Noah W. Gokey, XIII, George W. Henderson, I, Irving B. Mc-

Daniel, IV (really '17 regardless of any of '16's pretensions), Thomas F. O'Brien, II, George T. Paine, I, Forrest P. Sherman, William A. Sullivan, IV, and Gerald W. Thomson, I, with Louis Perkins, XI, of the Coast Guard for good measure. The lieutenant commanders, all on active duty for the Naval Reserve, are William C. Mehaffey, II, A. Edward Tuttle, II, and Richard T. Whitney, XI.

The Army colonels are the following: Charles E. Atkinson, I, and William L. Dennen, XII, of the Coast Artillery Corps; Leslie R. Groves, I, of the Corps of Engineers; Albert F. Hegenberger, I, of the Air Corps; and Allen F. Kingman, VI, of the Infantry. The lieutenant colonels are Lawrence L. Clayton, XIV, and Lucas E. Schoonmaker, VI, of the Coast Artillery; Hubert W. Collins, I, and Walter L. Medding, XV, of the Engineers; Edwin F. Barry, VI, Grafton S. Kennedy, II, J. Worthen Proctor, II, Jesse A. Rogers, II, and Simpson R. Stribling, VI, of the Ordnance Department; Francis S. Conaty, I, of the Quartermaster Corps; John C. Platt, XV, of the Signal Corps; and Robert N. Gay, IX-A.

The Secretary and Assistant Secretary submit this list with considerable pride and suggest that anyone who doesn't share their feelings should tell it to the Marines. Advance apologies are tendered for any names inadvertently omitted and in forthcoming issues of *The Review* we shall be happy to record any additions brought to our attention. — RAYMOND STEVENS, *Secretary*, 30 Charles River Road, Cambridge, Mass. PHILIP E. HULBURD, *Assistant Secretary*, Phillips Exeter Academy, Exeter, N.H.

## 1919

With these notes we conclude this year's comments about members of our Class. Your Secretary wishes the Class an eventful summer and looks forward to receiving some interesting mail about the events during this period, for publication in the November Review.

The Class held a dinner on May 13 in the main dining room of the Technology Club of New York, 24 East 39th Street, New York City. After an excellent chicken dinner, the subject of the 25-year reunion came up for discussion, with particular reference to the gift to the Institute at that time. Your Secretary would appreciate any suggestions about this from classmates. The Class will hear further in regard to this gift as the collection of funds for it is now being planned.

Dave Sanford and Harry H. Mardoian came from Stamford and New Haven, Conn., especially for this dinner. Dave is exceedingly busy with the architectural design of new housing projects in Connecticut, while Harry is assistant highway engineer for the Connecticut State Highway Department at Hartford. Others present were Ted Shedlovsky, Bernard S. Coleman, Fred Given, Leo Kelley, Karl Rodgers, T. M. Lloyd, R. R. Litehiser, S. H. Breed, and E. R. Smoley. Ralph Gilbert put in an appearance later in the



1919 Continued

evening. Litehiser is stationed at the New York Port of Embarkation in Brooklyn. Regrets were received from Jim Strobbridge, W. Pratt Thomas, Leon H. A. Weaver, Cut Davis, G. E. Gay, and George French. Jim Strobbridge is in the Army War College at Washington, D.C., and George F. French is a major in the Air Corps at Dayton, Ohio.

Leon H. A. Weaver is located at 145 Fishkill Avenue, Beacon, N.Y. — Ted Shedlovsky saw R. Moen Smith recently in Washington. — Cut Davis wrote from Springville, N.Y., that he was to be in the wilds of Canada for a week of fishing at the time of the dinner. "In order to be completely away from things for a week, we drive about 500 miles north of here, then take a plane for at least 50 miles, and then no telephones, telegrams, or radios can bother us. To get where I shall be, it would take the best part of a week by canoe or half an hour by plane. It's a great relief from priorities and the million and one headaches of too many orders and not enough material. We are working 100 per cent on priority orders that are all in our regular line, which helps considerably. Regards to the gang."

Alexis R. Wiren wired that he regretted he could not attend the class affair. — Other news of the Class indicates that everyone is busy in one way or another in war work. W. Pratt Thomas, who could not attend the dinner because of a lecture engagement, is a lieutenant commander in the United States Naval Reserve and resides at 110 East 54th Street, New York City. He left the frozen foods business to go into the service and is at present on active duty as a senior member of the V-7 selection board for the Naval Reserve.

Mrs. Walter O. Wood wrote from Old Bedford Road, North Westport, Mass., where she takes care of two boys, 16 and 14, and does some work for the Girl Scouts. — Erney Voss wrote from 2318 Bluebonnet Drive, Houston, Texas. He is with the Humble Oil and Refining Company and has a wife and two children, a boy 9 and a girl 5. For a hobby he has done some model railroad work and travels a great deal.

John Stevens, Jr., wrote from 918 Fulton Street, Wausau, Wis. He is vice-president of the Marathon Paper Mills Company and has a boy 10 and a girl 7. He said: "Seldom see any of the '19 men; too far up here in the sticks. Hope we can celebrate the end of the war before our twenty-fifth reunion or maybe concurrently." John's hobbies are fishing and hunting. — Jim Strobbridge, 2100 Connecticut Avenue, Washington, wrote that he is a major in the Corps of Engineers and is in army map service in the Army War College. Jim is married and has no time for hobbies as he works around the clock seven days a week. He has seen Wild Bill Pinkney, who is doing defense housing work in the northern United States area.

Dean Webster, Jr., is treasurer of the H. K. Webster Company, feed manufacturers. Dean lives at 16 Ditson Place, Methuen, Mass. He has a boy 13 and a

girl 10. Dean wrote: "We recently expanded our business substantially by acquiring and modernizing a large Quaker Oats feed manufacturing plant at Richford, Vt." In Boston, Dean has seen Elliot Cannell, who is still with the New England Telephone and Telegraph Company. Walter N. Webster '23 is also associated with Dean as director of nutrition. — C. L. Svenson is Assistant Professor of Heat Engineering at M.I.T.; has one daughter; lives at 45 Sheridan Drive, East Milton, Mass.; and indulges in gardening and woodworking for pastimes. — Henry R. Whiton, 2230 McFaddin Avenue, Beaumont, Texas, is a rate engineer for the Gulf States Utilities Company. He has a 16-year-old son, gets to Boston once a year, and does some gardening and automobiling.

B. H. Southwick, 37 Elvir Street, East Lynn, Mass., is still with the General Electric Company in plant engineering. He started electrical engineering work last year after specializing on steam production and distribution for 20 years. Southwick has a son, 8 years old, and sails for a hobby when he has time. He has seen Fred Smyser, who is in the General Electric Company's chemical laboratory at Clifton, Mass. He wrote that he hardly recognized parts of the state with all the new additions.

W. C. Patterson, Box 349, Waltham, Mass., under the name of Archie Tech, has had verses printed in the Boston Herald. — Henry B. Blumberg's new residence is Calton Court, New Rochelle, N.Y. The new address of Louis A. Brown, Jr., is 504 North First Street, Charlottesville, Va. Francis D. Porcher now resides at 434 West 120th Street, New York City. Russell J. Widdowson has moved from Melrose, Mass., to 170 Maple Street, Malden, Mass. — Let's make the Class of '19 have a better showing in the 1942-1943 Alumni Fund than we did the previous year. — EUGENE R. SMOLEY, Secretary, The Lummus Company, 420 Lexington Avenue, New York, N.Y. GEORGE W. MCCREERY, Assistant Secretary, 131 Clarendon Street, Boston, Mass.

## 1921

Response to the several notices announcing the 1942-1943 Alumni Fund has been particularly good on the part of those who have not previously given their support to Technology's new program. This last reminder is, therefore, addressed to those who have given so generously in the past but who have not as yet returned this year's card. Dig it out and mail it now. Prompt action will reduce administrative costs and insure continuity in your subscription to The Review. The first \$5.00 of your contribution is allotted to The Review and the Alumni Association; the balance goes to the Institute. Our goal is an average of \$15.

S. Paul Johnston, II, a lieutenant commander, has completed another book, which is entitled *Flying Squadrons*. It has been published by Duell, Sloan and Pierce, New York. As an outstanding authority on aviation, Paul has combined some 250 rare and startling pictures with

an accurate account of the eventful history of flying in general and the United States Army Air Forces in particular. As a member of the staff of the National Advisory Committee for Aeronautics, Paul's headquarters are in Washington. — "A Technology Bookshelf," published this spring by the Institute Library, lists many literary accomplishments of the Class. Paul Johnston's previous two books, *Horizons Unlimited* and *Flying Fleets*, cover the aviation field from the general point of view and in the development of our naval aviation services. Clarence H. Powell wrote *Graphical Treatment of Vibration and Aircraft Engine Dampers*, published by Bookcraft, New York. Manuel S. Vallarta, XIV, is the author of *An Outline of the Theory of the Allowed Cone of Cosmic Radiation* from the University of Toronto Press. Edgar E. Hume, a lieutenant colonel of the Medical Corps, has published a number of items on various subjects, including a history of the Association of Military Surgeons of the United States, General Washington's correspondence on the Society of the Cincinnati, the medical work of the Knights Hospitallers of St. John, and a history of Lafayette in Kentucky. Francis O. Holmes, VII, of the Rockefeller Institute for Medical Research, has written the *Handbook of Phytopathogenic Viruses*, published by Burgess, Minneapolis. Alan Osbourne, XIII, of the United States Maritime Commission, has collaborated in preparing Volume I of *Modern Marine Engineer's Manual*, Cornell Maritime Press, New York. Donald S. Piston, VIII, is the author of a textbook entitled *Meteorology*. The second edition was published by Blakiston, Philadelphia, in 1941. David O. Woodbury, VI-A, has written two books, *The Glass Giant of Palomar* and *The Colorado Conquest*.

Howard L. Vickery, XIII-A, a rear admiral, was the guest speaker at the annual banquet of the Propeller Club of New York, held at the Waldorf-Astoria Hotel at the conclusion of National Maritime Day. The affair was attended by more than 1,000 people identified with the marine industry. The day, which celebrates the sailing date in 1819 of the *Savannah*, the first steam-propelled vessel to cross the Atlantic, was particularly significant this year in view of the fast construction program which is progressing so successfully under Admiral Vickery's direction as vice-chairman of the United States Maritime Commission.

It is with deepest sorrow that we record the passing of three members of the Class. Hurley Gray Griffith, X, manager of the Houston, Texas, branch of the Foxboro Company, died on February 8. Griff was born in El Paso on June 12, 1900, and prepared for the Institute at El Paso High School. He was a member of Alpha Tau Omega and was on the Tech Show staff. — Ross Eugene Goddard, IV, died on March 17 at the United States Veterans Hospital, Oteen, N.C. Ross was born on November 17, 1892, at Hackensack, N.J., and transferred to the Institute from Cornell. He was a member of the architectural society. — Leigh John McGrath,

## 1921 Continued

I, died in Boston on May 10, Mac was born in Casper, Wyo., September 1, 1897, and came to Technology from the University of Wyoming. He was a member of the civil engineering society, Theta Tau, the swimming team, and Sigma Alpha Epsilon. He originally entered the construction field and then went into the paper industry. He terminated a long association with the Crown Zellerbach Corporation in 1940 to assume the duties of vice-president in charge of sales for the Curle Manufacturing Company of San Francisco, introducing a new development for producing accurate linotype slugs. Mac is survived by his wife, the former Jean Flemming of Cambridge, a Simmons alumna, and two sons, John F. and Thomas L. McGrath. His passing will come as a particular shock to those of us who went from New York to the reunion with him last year and spent those few days renewing our acquaintance. — Our sincerest sympathy is extended to the families of these classmates.

Army promotions have been announced for Ludson D. Worsham, I, who is now a colonel, and Louis L. Lesser, I, a lieutenant colonel. Philip M. Johnson, II, has entered the service as a lieutenant colonel; Thomas B. Card, VI, has received his commission as a major; and Victor S. Phaneuf, II, is a captain. — In the Navy, Lawrence B. Richardson, XIII-A, has been promoted to captain.

Juniors of '21 at the Institute who are in the spotlight include Thomas S. Barrows '45, who is on the Dean's list. He is the son of Ralph G. Barrows, I, a lieutenant colonel. Maurice T. Ireland '42, a captain in the Marine Corps, officiated at a recent testimonial dinner to his father, Mark L. Ireland, on the occasion of the latter's retirement from active duty as a colonel in the Quartermaster Corps.

The following new addresses have been received from the Register of Former Students: O. Kenneth Bates, II, 44 East Main Street, Canton, N.Y.; Dorothy G. Bell, VI, 3 Manor Road, Barrington, R.I.; Stuart E. Bradford, I, United States Engineers Office, Kingston, Jamaica, B.W.I.; Major Thomas B. Card, VI, Corps of Engineers, Army Post Office 804, care of Postmaster, New York, N.Y.; Lieutenant Colonel LeRoy M. Hersum, I, 2724 Munitions Building, Washington, D.C.; Lieutenant Colonel Philip M. Johnson, II, Company A, First Training Regiment, Fort Benning, Ga.; Lieutenant Colonel Louis L. Lesser, I, Eleventh Field Artillery, Schofield Barracks, T.H.; Major Joseph A. Mahoney, X, 4536 Macomb Street, Northwest, Washington, D.C.; Kenneth A. Moores, XIV, K. A. Moores Company, 2735 First Street, Seattle, Wash.; Colonel Lewis A. Nickerson, II, Ordnance Department, Field Artillery School, Fort Sill, Okla.; Rollin F. Officer, XV, 3324 North Third Street, Arlington, Va.; Captain Victor S. Phaneuf, II, 124 Concord Street, Nashua, N.H.; Captain Lawrence B. Richardson, XIII-A, Naval Air Station, San Diego, Calif.; Lawrence L. Willard, II, 7 Colonial Village, Middletown, R.I.; Colonel

Ludson D. Worsham, I, United States Engineers Office, Mobile, Ala.; and Yssel Y. Young, VI-A, Kansas Power and Light Company, 116 West Iron Avenue, Selina, Kansas.

And so we take leave until the next issue of *The Review* in November. With 21 years of notes on these pages behind us, we become of age in an age when your support is needed more than ever for these notes and for *Technology*. We shall appreciate your news when you send in the Fund card. Here's to victory and the return of fair weather. — RAYMOND A. ST. LAURENT, *Secretary*, Rogers Paper Manufacturing Company, Manchester, Conn. CAROLE A. CLARKE, *Assistant Secretary*, International Telephone and Radio Manufacturing Corporation, 1000 Passaic Avenue, East Newark, N.J.

## 1922

Dugald C. Jackson, Jr., '21, a major at the Frankford Arsenal, said he communicates frequently with Randall James Hogan '22, who is in charge of the St. Louis Ordnance District. — Frank Gage is back in the East, having temporarily given up his activities in the entertainment field. He recently made an extended tour of some of the army camps in the West. He is temporarily living in New York City at the 23d Street Y.M.C.A., and he is working for the electrical equipment house of Wesley Block and Company, 15 East 26th Street, New York, N.Y. In April, Frank showed up at the meeting of the M.I.T. Club of Northern New Jersey in Newark. He also came to our recent New York class dinner, where he entertained us at the piano in the same old style.

Ken Merriam, professor of aeromechanics at Worcester Polytechnic Institute, has obtained a leave of absence for active duty as a major in the Coast Artillery Corps, reporting to Camp Davis, N.C., where he will be an instructor in the antiaircraft school. Merriam is intensely interested in aviation, and as co-ordinator of the civilian pilot training program sponsored by the Civil Aeronautics Authority, he has supervised the training of 125 men in the Worcester area. — CLAYTON D. GROVER, *Secretary*, Whitehead Metal Products Company, Inc., 303 West Tenth Street, New York, N.Y. C. YARDLEY CHITTICK, *Assistant Secretary*, 77 Franklin Street, Boston, Mass.

## 1923

The abridged and streamline Alumni Day brought out no fewer members of the Class than usual. Among the regulars at such gatherings are H. B. Golding, E. N. Gelotte, D. W. Height, W. B. Greenough, E. L. Greenblatt, G. A. Johnson, J. A. Pennypacker, B. E. Proctor, G. Putnam, E. C. Rue, H. F. Russell, A. M. Valentine, D. E. Washburn, E. W. Willis, and your *Secretary*. On the Committee of Alumni Hosts, but unable to be present, were W. A. Gallup, G. N. Reed, and H. H. Zornig. — Holding the Alumni Day observance in April seemed strange, but the turnout which made one

of the largest banquets ever held by M.I.T. Alumni showed that our Alumni, busy as they are with war work, can take out a moment for an expression of their loyalty to *Technology*.

Jack Keck reports that Bill LaLonde, who is in the service at the Brooklyn Navy Yard, has acquired a new home at 77 Jefferson Avenue, Short Hills, N.J. Oscar Perkins, Jack reports, is to be stationed at Camp Edwards, Mass. At present he is a captain in the Army and is training at Fort Monmouth, N.J. — Other news from Jack relates to Stuart MacDonald, representative of the Frosted Foods Sales Corporation at Rochester, who is rapidly coming back to par after a four-month illness.

A clipping in the *New York Times* recorded the death on April 30 of Gilbert N. Ross of Newton Center. — John C. Flaherty, Dorchester, is now Captain Flaherty in the Army. — John Huling, Jr., has been promoted from major to lieutenant colonel, and Archie S. Buyers from lieutenant colonel to colonel.

If Jimmy Doolittle had been '23 instead of '24, saying something about how very much he is in the popular limelight would be appropriate. In his instance, thus close did fame miss '23. — HORATIO L. BOND, *Secretary*, 457 Washington Street, Braintree, Mass. JOHN M. KECK, *Assistant Secretary*, 207 Bloomfield Avenue, Bloomfield, N.J.

## 1925

This concludes another volume of *The Review*, and one in which you have had '25 notes in every issue. Frankly, some of the contributions have been rather slender, so, with this in mind, I am going to ask you readers if you'd rather have us miss some issues for the sake of a fuller column when it does appear, or continue as we have these past nine issues. Of course, a monthly magazine in which the deadline is almost a month before the publication date (this applies to the class news section only) can't hope to be as timely as a weekly news magazine, but your *Secretary* feels that even a single item appearing in the issue after it is received gains something in timeliness. In any event, this summer take the time to write a few lines to let us know which of these proposals you favor, and (here's the catch) be sure to include some news in your letter.

I quote a clipping from the March 29 *New York Herald Tribune*: "Mr. and Mrs. William T. Stokes, of South Pleasant Avenue, Ridgewood, New Jersey, announce the engagement of their daughter, Miss Jeannette Gray Stokes, to Mr. Clarence Thulin, son of Mr. and Mrs. Walfred Thulin, of Belmont, Mass. Miss Stokes attended Middlebury College, and was graduated from Barnard College." Clarence was a member of Course XIV at the Institute. After graduation he took a position with the Aluminum Company of America at its Massena, N.Y., plant. After several years there, he left to take a position as casting-room superintendent at the then new Cellophane plant of Du Pont at Buffalo. Unfortunately the acid



1925 Continued

fumes incident to this work had a bad effect on his health, and he resigned after a serious illness. His next position was with a brass manufacturing firm in Waterbury, Conn. This summary concludes with another quotation from the *Herald Tribune* item: "He is engaged in consulting management engineering and is at present in South Carolina." — Clarence was one of the few students to matriculate at M.I.T. below the minimum age requirement of 17 (at that time). He is thus, in all probability, the baby of the Class, and if we used headlines for class news, this item would have been headed "Baby Gets Married."

Some of you who were followers of wrestling during our stay at Technology probably remember Fred Greer, the captain of the wrestling team during our senior year. Fred has never left Cambridge. He is in his father's business, the J. W. Greer Company, manufacturers of bakers' and candymakers' machinery. I had a conversation with Fred the other day and learned that regular production is out for the duration. They are making "something for the Navy" now and will continue in this work as long as the war effort requires it. — Good luck to you all this summer. You'll hear from us again in the November Review. — HOLLIS F. WARE, *General Secretary*, 3 Aquavia Road, Medford, Mass. F. LEROY FOSTER, *Assistant Secretary*, Room 7-121, M.I.T., Cambridge, Mass.

## 1926

Wrote Whitney Ashbridge, a major in the Corps of Engineers: "I am now a very proud and delighted father. I am glad to announce the birth of a 9 pound 4 ounce boy, Richard Downing Ashbridge, on the morning of May 13 at Walter Reed General Hospital here in Washington. Both my wife and the youngster are doing splendidly. My only hope is that the little fellow will look more like his mother than his father. I think he feels this way about it too because last night he looked up at me and frowned." The Secretary has not seen Whitney since graduation time, but he has carried on with him a regular and entertaining correspondence. It is a great pleasure to record the important event announced in his most recent letter.

Henry Rickard wrote recently from Buenos Aires, where he is with the United Shoe Machinery Company. Henry is active in the M.I.T. Club of Buenos Aires, which is a very busy and well-supported club. It is the only organized club of American college men in Argentina. Henry sent along some examples of his photographic art, one a picture of Morro Castle taken on board a ship leaving Havana in a heavy sea, and the other an extraordinarily peaceful and pastoral view of the monastery of Apoquindo near Santiago, Chile. These mementos and interesting reports from far away places delight the Secretary and do much to justify retaining a post which without pleasant contacts personal and by mail would hardly be worth the candle.

William H. Dargan is now a major at the Matériel Center, Wright Field,

Ohio. In the Navy we have Thomas A. Esling, a lieutenant commander, whose address is care of the Postmaster, San Francisco. — Harold J. Ryan visited the Institute recently and the Secretary plied him with questions about his very active firm, Harold J. Ryan, Inc., which specializes in the design and installation of special air conditioning systems. Harold has done some extraordinarily interesting jobs in this field, including the installation of air conditioning equipment at the Waldorf-Astoria Hotel and the design of conditioning equipment for the testing of aircraft engines operating under substratosphere conditions. Here indeed is one of the few true consulting engineers in our Class. — JAMES R. KILLIAN, Jr., *General Secretary*, Room 3-208, M.I.T., Cambridge, Mass.

## 1928

Although we cannot give you their present addresses, many '28 men are in the armed services. In the Army are Argyle C. Abbott, Albert F. Briggs, and Vernon S. Brown — lieutenants; Lee G. Kendall and Alfred C. Knight — captains; William D'Espinosa and Norman L. Winter — majors; and Benjamin Kelsey — a lieutenant colonel. Classmates in the Navy include W. Creighton Clay, William S. McClintic, and Frederic D. Riley, Jr. — lieutenants; and Charles J. Maguire and Timothy J. O'Brien — commanders. Maxwell M. Kessler, Franklin McDermott, Norman C. Parsons, and Clifford B. Terry, whose exact ranks we do not know, are also on active duty.

Gil Ackerman is a very busy man these days, turning out ships for the United States Maritime Commission and the Navy at the Seattle-Tacoma Shipbuilding Corporation. Gil says he keeps track of M.I.T. and Boston through the younger graduates who get out each year, and he expects several '42 men with the latest news this summer. Gil said he was going through his Tacoma paper early in April when he ran across a familiar face. It was that of Ford W. Sammis, and the article accompanying the picture was headed, "Oil Executive Will Address Ad Club." The news clipping read as follows: "What To Expect In Advertising From Now On" will be told the Tacoma Advertising and Sales club Thursday noon at the Tacoma club by Ford W. Sammis of Los Angeles, director of the Pacific coast petroleum industry. Mr. Sammis has a wide experience in public relations and was former director of research of the Lord and Thomas Advertising agency. . . ."

H. B. Kane '24, Director of the M.I.T. Alumni Fund, has asked us to tell you that we need a bit more steam to go over the top for our 1942-1943 quota. At the end of May, 79 out of 274 had contributed to the Fund. Men of '28 are out to beat them all. When you are making out your check to the Massachusetts Institute of Technology, remember \$5.00 is the amount you have been paying the Alumni Association as dues, and this sum covers your subscription to The Review and your part of the Association and Fund

## THE TECHNOLOGY REVIEW

operations. The directors are anxious to obtain an average contribution of at least \$15. Can you do it? Will you?

The most recent papers read and published by Bob Harris are "Nutrition in War," presented at the annual meeting of the Massachusetts Medical Society and published in the *New England Journal of Medicine*; "The Evaluation of Fluorophotometers to Be Used in the Thiochrome Assay for Vitamin B-1," presented at the annual meeting of the Department of Biology and Public Health at M.I.T. and published in *Cereal Chemistry*; and "Food for Britain," printed in the March Review.

John Carvalho, VI, is teaching in the mathematics department of the M. C. Durfee High School, Fall River, Mass., and for the past two years he has been studying to complete his master's degree at Boston University's School of Education. Only a thesis, which he will do next year, remains to be completed. Recently John was initiated into Phi Delta Kappa, an honorary educational society.

John Connelly has the right spirit about these class notes. He registered a comment about not seeing '28 notes, then added that he had decided to set an example and send in some information about himself and others — which he did. Thanks, John. The trouble with most of you buckos is that you neither write nor kick. Either or both would be preferable to this silent pen stuff you pull on us. John was recently elected president of the York, Pa., Chamber of Commerce. That's swell news. Congratulations. From a York newspaper, we quote the following which appeared in the announcement of John's election: ". . . Soon after graduation Mr. Connelly took a special training course with the York Ice Machinery corporation and subsequently entered that company's employ as assistant erecting superintendent in the Boston territory and later as erecting superintendent in the corporation's Syracuse territory. Still later he became a member of the engineering staff of the Bird's Eye Frosted Foods division of General Foods.

"He returned to York in 1933 to take over the operation of the Golden Rule store upon the death of his father-in-law, the late Guy C. Bastress. Since he came to York, Mr. Connelly has been active in civic affairs and has served in various offices in the Chamber of Commerce and for one term as chairman of the York Retail Merchants council. He has been active in all of the campaigns of the York Welfare federation in recent years and is one of the founders of the University club of York." — GEORGE I. CHATFIELD, *General Secretary*, 6 Alben Street, Winchester, Mass.

## 1930

Course II holds the center of the stage as we conclude this volume of The Review. In March the Joe Harringtons welcomed the arrival of Anne, their third child and second daughter. Fred Trescott was married in April to Laura Benedetti of Quincy, Mass. To both classmates, congratulations! — The Alumni Banquet in

1930 Continued

Boston on April 25, brought out five of the faithful: Earl Ferguson and Scotty, VI-A; Bob McCarron, X-B; Joe Harrington, II; and your Secretary. This was Earl's first return to the Institute since graduation. He is working with the New York Telephone Company, concentrating on depreciation studies. — Sid McCuskey, IX, has recently been advanced to associate professor of mathematics and astronomy at Case School of Applied Science.

Two classmates are in Washington in the government service. Leo O'Neill, III, is in the minerals division of the Office of the Coordinator of Inter-American Affairs, while Bob Nelson, XVI, is in the production engineering section of the Navy's bureau of aeronautics. — Recent commissions in the Army have been awarded to a dozen '30 men. Our three majors are Herb Ehrigott and Jim Loomer, II, and Cecil Dunn, VII. Among the new captains we find Sam Duerson and Ray Rolin, I; Fairleigh Smith and Morris Young, X; and Ralph Appleton and Charles McAliley, XV. Jim Keely, VI; Dick Whitehead, XI; and Ollie Payson, XV, are lieutenants. Your Secretary will be glad to furnish the addresses of these classmates to any of you who may care to send along a word of greeting and good cheer. — I cannot close without a plug for Phil Holt and the 1942-1943 Alumni Fund, for which he is our Class Agent. The Fund and Phil both deserve the support of us all, so let's put '30 on top. — PARKER H. STARRATT, *General Secretary*, 1 Bradley Park Drive, Hingham, Mass.

## 1934

It is a shame that the class note columns do not have illustrations, for our space for this month should be decorated with pink and blue ribbons. The announcement of four new arrivals constitutes most of our news. — A letter from Teddy Rimbach stated: "A second, and very recent, addition to the family — this time a Donald — calls for a burst of something or other. The last time I became so ambitious was three years ago when our Dick was born, but somehow the letter went astray and the announcement never did get published.

"Our class directory sure was a good job on the part of Bob Roulston. The war has involved me, like so many others. I am taking over the St. Louis office for the Permutit Company. Right now all my activity seems to be centered in Arkansas, so I am learning the geography firsthand, as I get around to the various war plants under construction. Despite the news reports, my personal experience watching the construction of many of the plants is that on the whole some real progress is being made.

"With all the banging around I have done in the past several years, I am surprised that I have met but few of our fellows. When in New York last time, I stole a few hours to visit my folks in Boston and saw Charlie Partridge in the hospital. Am glad to report that he is recovering nicely from a major opera-

tion, and a recent note said that he is as good as new. I do not recall reading any notice of the birth of John Barton Haines, Reuben's first youngster. That's about all the news I have, but in the future I shall try to write a little more often than every three years." Congratulations, Ted and Reuben, and thanks, Ted, for the letter.

An announcement from our President brought the news of the birth of a daughter, Nan Patton Bell, born on April 3. — Now it is my turn to do a little crowing. On May 2, I became a father for the second time. This addition is a boy, John Gurney Callan, 3d. He decided to arrive somewhat ahead of time, and consequently I had to make a flying trip from Sharon to Cambridge. I went through five red lights and three signaling policemen. Mother and son, however, are no worse for the experience.

John Burwell has just accepted a commission as a lieutenant, junior grade, in the Naval Reserve. His work will be in the engineering field. Slap down an extra Jap for us, John. — Well, fellows, this summer how about taking a little time to scratch a few lines for the benefit of your classmates? They will be very much appreciated. — JOHN G. CALLAN, JR., *General Secretary*, 184 Ames Street, Sharon, Mass. ROBERT C. BECKER, *Assistant Secretary*, Chile Copper Company, Chuquimata, Chile, S.A.

## 1936

Good news has come! This column does have one reader! Lawrence Peterson has written a letter complaining about the infrequent appearance of '36 news and declaring that he is one who has done something about it by sending a six-page letter full of news which we never printed. Well, Pete, I haven't located the missing letter yet, but I hope to clear myself by putting your recent letter here at the beginning this month. Pete is married, fellows. It happened way back on October 24 in the Trinity Methodist Church in Schenectady. The bride is the former Lillian Earle of that city. Pete continued his letter with some news about a few others of the Course VI-A group: "Norm Willcox has been heard from again. He represented the Pittsfield section of the American Institute of Electrical Engineers in a presentation of technical papers in competition with the Schenectady section. I suppose it is not news at this late date that he became a papa last year. Len Wuosmaa is working in the generator and motor engineering department of the Schenectady works here at the General Electric Company. I am working for the planning and wage rate department and have just recently been transferred from the generator and motor section to the vacuum tube division. O. B. Falls is in town now, working in the general office commercial department. He was transferred from the Pittsfield works. I had quite a chat with Bill Keefe '35 a couple of weeks ago when he came to Schenectady from the Chicago office to use the network analyzer for a few days."

Here is a late flash. We have a second reader! Just received a letter from Fletch

Thornton, who wants to know what has become of the '36 notes. By the way, you probably will recall that Fletch is our Class Agent for the Alumni Fund, and you probably received a letter from him the same time as I did. To any of you who have not yet anted up, need I say any more? Fletch said that he had two items to give the column a start — El Koontz is married and Gordon Thomas is with the Army in the Panama Canal Zone. On April 18 El was married to the former Barbara Jean Bowlby of Minneapolis. The bride and bridegroom live at 2445 Third Avenue South, Minneapolis.

Mentioning Gordon Thomas with the Army brings us to our news of men in the armed services. Some of the boys have recently earned promotions. Advanced from captain is William Creasy, now a lieutenant colonel with the Chemical Warfare Service at Pine Bluff Arsenal, Ark. Promoted from lieutenant is Wilbur Skidmore, now a major at Fort Totten, N.Y. Other recently promoted majors are Walter Bain, Jr., with the Air Corps at Wright Field, and Marshall Carter, in the Canal Zone. Our own President, Jack Austin, has shown his colors by being promoted to the rank of captain. He is with the Coast Artillery Corps at Fort Hantilton, N.Y. Captaincies have also been earned by Walter Sylvester at the Aberdeen Proving Ground Ordnance School, and by Roman Ulans with the Signal Corps at Camp Crowder, Mo. Al Bagnulo is a captain, stationed at Antigua, British West Indies, as is John Meeks, who is with the Ordnance Department at Pedricktown, N.J.

After that imposing list of high-ranking officers, we get to the men doing the work — the lieutenants, who are as follows: Carl Peterson, with the Air Forces in Washington, D.C.; Charles Price, Jr., with the Assistant Chief of Staff G-2 at the capital; Bushnell Merrill, in Dayton, Ohio; Julian Rifkin, at Camp Tyson, Tenn.; Edson Snow, at Lexington, Ky.; Marc Warmuth, at Camp Wallace, Texas; Gerry McMahon, in the Canal Zone; Mel First, in Bermuda with the Coast Artillery; and Lewis Gelbert, at Fort Devens, Mass. Others who have recently been made lieutenants in the Army are Dave Mathias, John Gardiner, Bob Caldwell, John Valtz, and Ken Blaisdell. Eli Grossman is in the medical detachment at Stark General Hospital, Charleston, S.C.

In the Navy, we find Edward Brewster a lieutenant at the submarine base at Pearl Harbor, Stan Freedman an ensign at the National Naval Medical Center, Bethesda, Md., and Bob Hannam a lieutenant in ordnance work.

Some of us are still left in civilian life. Stan Levitt is with the firm of Olsen, Dentrack, Carr, and Greiner, of Cherry Point, N.C. Dr. Daniel Norman is with the New England Spectrochemical Laboratory at West Medway, Mass., and Donald Washburn is at New Haven with the Page, Steele and Flagg Company. Doug Elkins is an assistant engineer with the Federal Bureau of Mines. He has recently designed a machine to speed up the process of dressing manganese ore by



1936 Continued

utilizing steam to shatter the lumps of ore, in a manner similar to that used in the manufacture of Puffed Wheat.

A few of the Class are still finding time, what with war work and civilian defense activities, for such things as weddings. Besides El Koontz, previously mentioned, Art Nyquist, Rufus Isaacs, and Marshall Cloyd have taken the vows. Art's bride was the former Margaret Robinson and the ceremony was performed on March 15. Art is with the American Cyanamid Company in Stamford, Conn. Rufus Isaacs went to Miami Beach to get married to Rose Bico on January 25. After the Florida honeymoon, the couple returned to Hartford, where Isaacs is an engineer at Hamilton Standard Propellers. Rufe received his master of arts and doctor of philosophy degrees from Columbia University. And on February 14, Marshall Cloyd was married to the former Mrs. William Spears. After leaving M.I.T., the bridegroom attended Southern Methodist and Harvard Business School. — ANTON E. HITTL, *General Secretary*, West River Road, Grand Island, N.Y. ROBERT E. SAWYER, *Assistant Secretary*, 35 Lawndale Street, Belmont, Mass.

## 1938

June is a great month they say, and I think I can quote several '38 men on that. Howard Magrath of Dayton recently became engaged to Ilene Zinger of Grosse Ile, Mich. Art Dwyer's engagement to Ruth Butler of Whitman, Mass., has been announced. Art attended Harvard Law School after leaving the Institute.

Other engagements include those of Louis Bradford an ensign in the Naval Reserve, to Eugenie Rowe, a graduate of Bennington College. Tony Smith is engaged, we hear. Del Williams of Richmond is the girl, and from what Tony says, these southern girls sure are grand. — Invitations have been sent out for Enver Muratzade's wedding in Los Angeles. The couple is planning to live in Pasadena. Bob Eddy's marriage to Brownell Wheeler was planned for June 13 in Larchmont, N.Y. — John Withers was married last March to Clara Margaret Grantham of East Orange, N.J. Paul Tillson was one of the ushers.

News of Aram Kerkian reveals he is now an ensign in the Naval Reserve, assigned to the Medical Corps. He was formerly health district sanitary officer for the Massachusetts Public Health Department.

By this time you should all have received a letter from our Class Agent, Lloyd Bergeson. Let's all remember that the annual Alumni Fund now takes the place of all other forms of solicitation by the Institute, as well as paying for alumni dues and your issues of *The Review*. Send in your contribution as soon as possible and boost '38 over its quota. — We regret to announce the sudden death of Ross B. Teel on May 13. — DALE F. MORGAN, *General Secretary*, 142 Woodland Avenue, New Rochelle, N.Y. RICHARD MUTHER, *Assistant Secretary*, Room 1-180, M.I.T., Cambridge, Mass.

## 1940

C. C. Powell, VII, was commissioned as an ensign in the Naval Reserve on April 9. His duties will be in the general service of the Medical Corps. Ensign Powell is a medical student at the Boston University School of Medicine, which he has been attending since graduation.

Tom Creamer wrote that he had seen several of the boys on Alumni Day. Ackerson, Braunlich, deOlloqui, Goddard, Grosselfinger, Laven, Martinez, Wight, Wiley, and Wilson are the ones he mentioned. Dave Mowrer is in the Engineers' Reserve Training Corps at Fort Belvoir, Va. Dixon Speas is in the engineering department of American Airlines at Municipal Airport in New York City. Jack Schaum is with the Bureau of Mines, College Park, Md. Olaf Rustad is now with the Royal Norwegian Army somewhere in Scotland. Hans Otto is in Manhasset, N.Y. He had a short visit with Rustad just before Olaf started on his trip to Europe.

Marjorie Elizabeth Park and Barrett L. Taft were married on Friday, May 29, in Gordon Chapel in the Old South Church in Boston. Marion Isabelle Lincoln became the bride of Robert V. Gould on April 29.

This is the last number of this volume of *The Review*. During the summer many of us will be moving about. Please don't allow us to lose track of the Class. It is so easy to just drop me a post card. Please do that so we can have a little news. From the size of our last few columns, it is easy to see that our Class is slipping.

Tom Creamer sent in two letters. The first he received from Del Churchill, who is now a lieutenant at the headquarters of the 503rd Signal Aircraft Warning Regiment at Drew Field, Tampa, Fla. Del said: "I have been here for a few months, with a brief interlude at the Orlando Air Base, Orlando, Fla. We are one of several aircraft-warning regiments whose main purpose at the moment is training personnel. We work in close liaison with the Air Corps and are attached to the Third Interceptor Command.

"There are two other M.I.T. men with our outfit — Fred Altman '37 and Dan Farmer '36. The three of us form the technical staff of this setup. So you see, like lots of other good organizations, we're guided by Tech brains."

Nils Rosenberg, who is in the Royal Norwegian Air Force at "Little Norway," Toronto, Ontario, wrote to Tom as follows: "It seems ages since we pattered around with labs, quizzes, and so forth. Contrary to my feelings then, it seems pretty wonderful now. This war sure scatters the fellows more than we expected when we left the Institute, each for his particular job. I've had word from Panay, Hans, and Olaf, with a few bits of news from some of the rest. Olaf wrote from Halifax, where he has joined the Army, and Panay was just leaving for some arsenal in Arkansas. I've often wondered about Chappie and how the Navy is using him. I suppose he is busy launching ships.

## THE TECHNOLOGY REVIEW

"I have been in the Royal Norwegian Air Force since February 9, with a leave of absence from Allis-Chalmers for the duration. I am stationed in Toronto for the present time, and since Janet joined me about a month ago, even Army life isn't so bad.

"I am training to be the equivalent of a United States squadron engineer. At the beginning, when Janet was still staying in New Jersey, I spent quite a lot of time at the Phi Kappa Sigma house at the University of Toronto. They are a darn nice crowd there. Erik Lorentzen '45 joined up some time after I did, and we have seen quite a good deal of each other." — H. GARRETT WRIGHT, *General Secretary*, 44 Main Street, Hilton Village, Va. THOMAS F. CREAMER, *Assistant Secretary*, Room 3-208, M.I.T., Cambridge, Mass.

## 1941

Before we start on this, the last column of the school year, we might explain how this news ever gets writ. Noos is gathered by hook or crook in the desk of the Philadelphia half of this column; the column is then forwarded to the Cambridge representative. The latter then adds the information which has sifted into that smoky city and forwards the entire item to *The Review*. So you can see who has the last word in this bunch of notes. Needless to say, it was this same modest individual who spoke about the location of the better (?) half of the writing combine. Joking aside, it has been a pleasure writing with Ahrendt.

Before we go into the latest noos let us take this opportunity to urge you to subscribe to the Alumni Fund in addition to buying War Bonds. In our mind they both lead to the same thing. Bonds will buy the guns and jeeps; the Alumni Fund helps to round out the education of the officers who are to command those guns. We are not saying that Technology is the background of the war effort, but we can say that you will have to go a long way to find another institution which is contributing as much in personnel and gray matter. You men who have been away for a year do not realize this as strongly as some of us who have been to Cambridge in the past few months. Nuff said. Let's back Folberth; he's doing a swell job.

Ed Marden writes a highly amusing letter on conditions in Newfoundland. Wish it could all be repeated, for Ed's situation is quite enviable. He wrote: "But this is rugged country! The terrain looks as one would imagine Norway does. Cliffs, gorges, valleys, and dozens of rivers and streams are everywhere. If you like fishing [and we do] take the next boat up here [who knows]. Brook trout can be caught by the dozens at any time, and soon the salmon start to run — something everybody is looking forward to." Ed is in his old game of construction work.

Mr. and Mrs. Benjamin Franklin Lewis announced the marriage of their daughter Janet Elizabeth to Joseph Harriman Myers, a lieutenant in the Army. (Told you we'd include middle names of those who did not write.) Margery Hanson is

1941 Continued

engaged to Conrad N. Nelson, now a lieutenant at Wright Field. Muriel Childs is engaged to Elwood L. McGee. Natalie Goodale has become Mrs. Walter D. Hudson. Lieutenant Hudson is stationed at Hill Field, Ogden, Utah. Good luck, one and all.

Officers at training center headquarters, Randolph Field, looked at the roster of Class 42-d, which included two men from M.I.T., and with typical Army reticence smiled broadly, and said, "Encouraging." Referred to were John M. Allen and Richard T. Cella, '39, both lieutenants. At Cornell University, Bal Dattatreya Kalelkar, of Wardha, C.P., India, who received his master of science degree with us, was given the Edgar J. Meyer memorial fellowship award for engineering research.

We heard George R. Harrison, Professor of Physics at the Institute and newly appointed Dean of Science, speak at the May meeting of the M.I.T. Club of Philadelphia. We met a few familiar faces there. For the first time at such a meeting we found that we were not the youngest Alumni present. Jack Sheetz represented the Class of '42, and we are now out of the baby class in the alumni group. Ran into Sam McCauley who is working out at the Atlantic Refining Company on the other side of our famous quartermaster depot. Sam gave us the following news. Mason Downing is an instructor at Edgewood Arsenal; Clark Benson '40 is at General Chemical; Pahnke is at Du Pont's in Wilmington; Coombs and King are with the Chemical Warfare Service in Cambridge. We are planning a Philadelphia gathering of '41 men in the future, and hope it doesn't fizzle out like the New York meeting. (Our fault; we never got back to the city for any length of time after the war broke out.)

Back in Boston — on the marital front, Norman Shapira, now a first lieutenant, took as his bride Charlotte Brudnow; best wishes. Norm is stationed at Edgewood Arsenal in Maryland. Another chemical engineer, Bill Cadogan, came into the service with his first assignment at Aberdeen Proving Ground. Bill is now out at Paducah, Ky., and sent in his last glimpses of Aberdeen, where Ray Harper and Hank Avery are in the publication office of the Proving Ground's ordnance school. Bill Kussmaul and Mario Conti are still down there. Mert Richardson is flashing a silver bar as of February 1, down at Camp Lee. Mert is doing mess inspection and stuff. Rog Finch, also a first lieutenant, found that the Quartermaster Corps was a bit stubborn about releasing its officers to the Air Corps. Rog is regimental regulating officer, with the job of battalion gas officer in sight. Howie Samuels lives around the corner from Lieutenant and Mrs. Finch. Yes, Samuels has succumbed.

Am quoting Les Corsa word for word — can't add a thing: "Went to the annual dinner of the M.I.T. Club of Northern New Jersey on April 16. Seven '41 men were there to hear Professor Magoun '18, Horace Ford, and Chester Barnard, President of the New Jersey Bell Telephone

Company, and to eat some mighty good Newark Athletic Club roast beef. There was Bob Wooley, who came to us from the Philippines in 1937 or so. Bob had some good dope for us on what was then a hot spot in the news. Bob's with International Telephone and Telegraph and lives in northern Newark, I believe. In the excitement of breaking up after it all, I missed getting addresses. Ralph DeLano now with Sperry Products in Hoboken, N.J., was there, and two ex-Newark Engineering fellows who were graduate students at the Institute during 1940-1941. — Peter Homack, XI, now an ensign at the Brooklyn Navy Yard and commuting to his home in Cranford, N.J., and Frank Filippone. (Pete had met Ken Rowe, X, and other classmates while he was at Annapolis during the summer.) Bill Stanhouse and another fellow whose face is in my mind but not in our 'Technique,' so far as I can see, and whose name I've forgotten, completed the list.

"You'll be glad to hear that George Clark's roommate recently received a letter from Norm Kridell, now a lieutenant in the Army on some island in the Pacific. George is still at the New York Information Center. No air raids yet. He's a first looey, as I guess most of the fellows are now. Nothing further on Lew Jester. Our old track captain, Vern Kyllonen '40, wrote from deep in the heart of Orange, Texas, that the state is ideal for track and shipbuilding. "I've been accepted by Boston University, and will probably get a commission in the Medical Corps, under which I can go to medical school and intern a year before entering the service. This depends on the war."

Another letter deserves honorable mention for news content. Ivor Collins wrote: "Yours truly is an ensign O-V(S) in the Naval Reserve now, having been sworn in at the Detroit Naval Armory on April 30. The O-V(S), incidentally, stands for 'Commissioned Ordnance Officers Qualified For Specialist Duties.' I have a fancy diploma signed by the acting Secretary of the Navy and a whole slew of papers to fill out. Now all I'm waiting for is orders telling me where to go and to whom to report. I'm still working at Detroit Edison, but as soon as orders arrive, I'll be on my way. One of our draftsmen is going to Harvard and then to M.I.T. for schooling, and the way I feel now I'd even welcome a stay at Harvard in order to be back in Boston. Detroit is all right, but I'll still take Boston.

"Had a letter the first of the year from Bob Montana. He was in San Diego at the time, and seemed to be doing all right. He's an ensign in the Naval Reserve, too, and was stationed at the Naval Air Base. Can't say whether he's still there, but I intend to write a letter anyway and hope he gets it. Also had a swell letter from Oscar Hedlund giving all the low-down on goings on around Technology including engagements and weddings. And so the list of eligible '41 men gets smaller and smaller. My name is still on it, however, and in small print. No more word from Carl Aronsen except a Christmas

card. I've written the lad about once a month trying to get a rise out of him, but no soap. [Carl's not the only lazy fellow.]

"The company had a high mortality rate in the student engineer ranks this year. They hired four class of '41 men — one from University of Michigan, one from the University of Pittsburgh, one from Notre Dame, and one from M.I.T. The one from Notre Dame left in November for a job with a shipyard in Cleveland; the one from Pitt left in March for the Ordnance Division of the War Department, Pittsburgh District; and now I'm leaving for points unknown. The fourth is married and doesn't feel like pulling up stakes, I suppose. The mortality in the whole drafting room (where I am) is pretty high, but they're not trying to keep the men from going, as our work is falling off fast due to lack of materials." Think we will find that the conditions that Ivor describes are quite common everywhere one goes.

Weedon is commuting between Washington and Philadelphia. It is a question as to who sees him more, Guething and Affel or the Philadelphia half of this column. Herb Moody called us up one day this week, but we were out. He is traveling out of the Weldon Springs Ordnance Works in Missouri, we hear. We met Art Spear, now a lieutenant, on the train back from Boston last week end. Art was married recently, and the couple is now located at Fort Belvoir, Va. The other night I heard a little song which hit the spot: "I wish that I were back again at the Tech on Boylston Street. . . ." — or even in Cambridge, for that matter. — STANLEY BACKER, *General Secretary*, 46 Bicknell Street, Dorchester, Mass. WILLIAM R. AHRENDT, *Assistant Secretary*, The Graduate House, M.I.T., Cambridge, Mass.

## 1942

Stand back you old-timers — make way for the Class of '42 and for news from the "hurricane hobnobbers." Words are brief this month, since the letters haven't had a chance to roll in yet, and a personal canvas conducted from the wilds of Illinois has yielded rather meager results. Let's make those letters contain more than corrections of mistakes, though. There are gold mines of adventure, information, and humor waiting to be tapped by your pens. This eager column hangs out its arid tongue for your news. How about that?

As with news of every nature, word of the men of '42 is already coming from the many corners where the armed forces seem to be finding ways to use Tech men. The Army claims the largest share, approximately 120, and will probably soon see many others active in electronics, procurement and supply, and in various other technical functions which may be considered more important than similar defense-plant work. The boys in blue are many, too — some in engineering aboard ship, others in procurement and inspection, and still others in the supply end. So far no word has come of any neophyte fliers in Uncle Sam's forces,



1942 Continued

but the thrill of action of this type will probably successfully tempt more than one of us.

On May 8 most of the R.O.T.C. men found themselves headed southward for brush-up courses in preparation for active duty. At Fort Monroe, Va., the guns of the Coast Artillery Corps are spraying the horizon for Harry Helm, Jack Arend, Bill Strong, Donn Barber, Doug Crawford, Bob Ely, Dick Meyer and the rest of the group. At Fort Belvoir, Va., Bill Avent, Charlie Kelley, Curt Buford, Phil Phaneuf, and the boys are going through their paces with the army engineers. Ed Edmunds, Jack Whelan, Harry Brightman, Clyde Hayward, Dan Schaeffer, and their gang are adding aroma and smoke to the air near Edgewood Arsenal, Md., with the Chemical Warfare Service. Fort Monmouth, N.J., was probably very slightly disturbed by the Signal Corps group, which includes Jack Quinn, Bernie Driscoll, Dick Gibson, Brad Torrey, and Ed Todd. The Ordnance Department boys will soon be in their various jobs — heckling defense industries or cracking dog whips in Alaska. Perhaps Freddy Olsen, Al Clear, Marsh McGuire, Frank Herlihy, Dick Russell, Bruce Anderson, or some of the rest could tell you more of this. The Course XVI lads who have non-flying commissions in the Army Air Corps find themselves either at Wright Field in Ohio with Hank Titzler and the group, or in Texas with Bill Schoen, Dave Whitcomb, and company.

There should be much interesting news of good times, achievement, neophyte troubles, and so forth from these groups. How about some kind of a delegate's report from each group once a month?

News from the Navy is less plentiful and even more vague. Wearing the blue are Johnny Carleton, Bill Horton, Shep Tyree, Olly Swope, Barney Ring, and Carl Trexel, among others. Some of these

men are training for active service, and others are doing technical work. We should like to hear from these meteors of the Class and particularly from those who are stationed in groups.

The lure of graduate work at the Institute finds Karl Wenk, Dave Christison, Jack Loveland, Henry Lemaire, George Illich, and others still studying integrals and all that, while Carl McGinnis faces the task of getting two degrees next year. Hawk Shaw and Fred Sargent lead the renegades who have hied to graduate schools at Harvard.

Putting oil on the gears of industry, we hope, are George Anderson with the Koppers Company in New Jersey; Max Anisz with the Celanese Corporation of America in New York City (Look out, Manhattan!); Harry Heineman with Standard Oil of New Jersey; and Walt Eberhard with the Hygrade Sylvania Corporation in Pennsylvania. Jerry Coe is working with Charles Reed '37, formerly of the Course X staff, on research development work with the General Electric Company and its subsidiaries find Dan Hulett, Mal Anderson, Carl Jealous, Dick Kelly, Dick Merritt, Bob McBride, Harry Knox, and Ed Yoder spread over the Atlantic seaboard. Johnny Ewing is working for Cleveland's power company, and airplane factories, munitions plants, and assembly lines of all kinds have absorbed many of the Institute's most recent graduates. Waits the scribe anxiously for a word from each and all. Can do?

To put news in a kindlier light, the Class of '42 has already made itself prominent in nuptial circles. Don Fork who is in the Army Ordnance Department, was married to Nancy McLaughlin in Chicago before graduation. Fred Sargent walked to the altar on April 18 in Schenectady with Virginia White and plans to live in Brookline while continuing his study of

human fatigue at Harvard University. (After the horrible hawk applies the doctoring he expects to result from training at Harvard Medical School, Fred's research will probably be very necessary.) Louise Gailbraith and Fred Dierks are setting up house in Kansas City as a result of a marriage ceremony on May 2. Ted Badger, also with the army engineers, is considering himself in the upper stratum these days. The former Betty Whitehill is the lucky girl. Harold Elrod, an ensign in the Navy, and Ruth Allison Starr of Lasell Junior College are also of this illustrious group. By this time, Mrs. Elrod has probably become used to finding her husband among the other blues in Annapolis, Md. On April 27 Francis Miller was a busy and proud man indeed, for Shirley Davis became Mrs. Miller shortly after the Symphony Hall exercises.

The list of "almosts," — already appreciable before graduation — has found Dick Gibson engaged to Olive White, a Simmons gal from Milton, Mass. Bob Evans claims similar distinction. The lucky lady is Adelaide Roberts, a Wellesley junior. Much more news is expected from this home front in short order. Let's hope what comes in is still news.

So the Class of '42 takes its place alongside Tech men of other years in the program for America — in the armed services, in defense plants, in further professional study, and in the alumni news. Let's keep this column sparkling with the doings and undoings of our classmates. Get those chain letters rolling, the group chatter started into print, and keep up that spirit of good fellowship so apparent in those last few days in April. It doesn't take long to write a few words, and there are a great many of us who are anxious to read them. So unfurl that paper, oil up that pen, and let's have a news column. — FRED BAUMANN, JR., *General Secretary*, Golf, Ill.





**How NOT to drag hose.** Avoid pulling kinks in hose. Take time to **LIFT** and pull over rough places.

## War on *Wear!* **MANHATTAN'S** Suggestions for the Care of **RUBBER HOSE**

You can make your rubber hose last longer if you follow these 12 Rules carefully. This is patriotism and efficiency.

1. Avoid sharp bends at fittings; also twists and kinks in body of hose.
2. Attach couplings carefully, forcing shank straight into hose, using soap and water lubricant.
3. Straighten hose before dragging and while unpacking. Do not forcefully bend, twist, kink, or pull hose.
4. Do not stop flow by kinking (see illustration); this ruptures fabric reinforcement.
5. Do not let hose lie in sun, hot or damp places.
6. When not in use, drain and roll up, but do not suspend on nail.
7. Do not permit heavy objects to run over hose.
8. Avoid excessive temperatures, violent fluctuations of pressure, unnecessary flexing, oil or grease.
9. Rotate large hose periodically to distribute wear and handle with ample supports to distribute strains.
10. Use the correct type and size hose for the conditions.
11. Store in dark, cool place.
12. Consult MANHATTAN Representative.

The qualities that result in long life have been a MANHATTAN objective for 50 years in the "engineering" of its rubber products for industry.

Thomas H. Boyd, '23      Wilder E. Perkins, '25  
Charles P. McHugh, '26      Daniel J. Hanlon, '37  
Albert W. Beucker, '40

**KEEP AHEAD WITH**



*This is No. 2 of a series on rubber conservation. Reprints are available in card form, punched for hanging.—Write for them.*

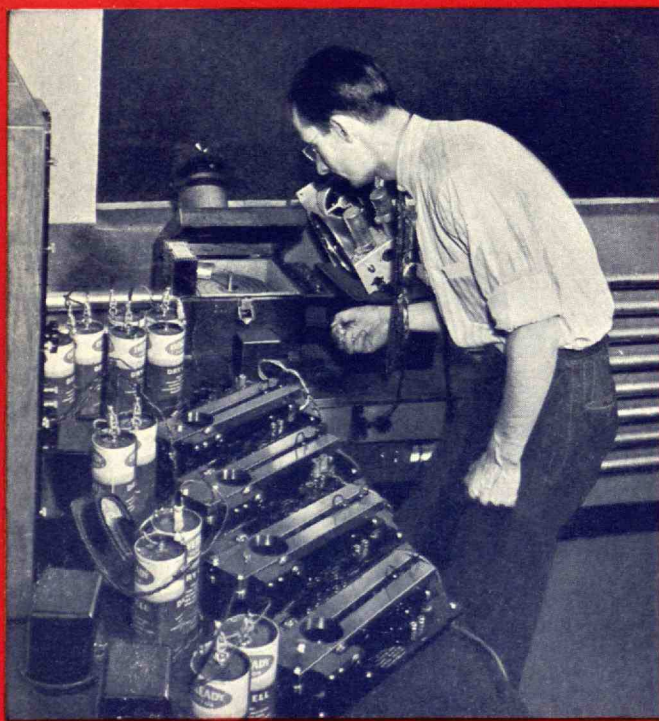
**THE MANHATTAN RUBBER MANUFACTURING DIVISION**  
of RAYBESTOS-MANHATTAN, INC.  
EXECUTIVE OFFICES  
PASSAIC, NEW JERSEY

**How NOT to use hose.** Do not shut off hose this way; it will speed breakdown, slow-up production.



# TWENTY PARTS PER

# MILLION



*The Type 815 Precision Fork is calibrated in terms of the G-R Primary Standard of Frequency. A harmonic of the frequency standard drives a 1,000-cycle motor to which is affixed a paper stroboscopic disc. The output of the fork is amplified and flashes a G-R STROBOTAC, used to illuminate the stroboscopic disc. By counting the number of spots on the paper disc passing a given index per unit of time, the frequency of the fork can be measured to within a few parts per million.*

A TYPICAL used in manufacturing and testing G-R equipment is the Type 815 a low-frequency standard, in laboratory testing, and in rating clocks and watches. These forks are supplied for frequencies of 50, 60 or 100 cycles. They are calibrated to an accuracy of two parts per million.

ILLUSTRATION of the care

ufacturing and testing G-R Precision Fork, widely used as geophysical exploration, general

The material from which the forks are made is low-temperature-coefficient stainless steel, received from the supplier in the form of bars. As the temperature coefficient of different lots of steel varies, a sample fork is made from each new lot and the coefficient is obtained after a protracted temperature run.

From previously determined mechanical tolerances, the forks are then machined in our shop. The average fork as received from the shop is about two cycles below its nominal frequency. The initial frequency is measured to within one millicycle. From data previously obtained, the amount of material to be milled from the ends of the tines is determined, and the fork is returned to the shop for the first rough adjustment. A second check to within one millicycle is then made, and if necessary the fork is returned to the shop again for further adjustment. Occasionally a third rough check and adjustment are required.

The fork is then ready for final adjustment and calibration. A hole is drilled and tapped in the end of each tine to receive two adjustable loading screws. The frequency is measured to within one millicycle with both tine holes empty, with an inner tine screw in each hole, and then with an outer tine screw set up tightly against the first screw. From these measurements the approximate amount of material to be cut from the tine screws to bring the frequency very close to its nominal value is ascertained.

The fork is then allowed to run for a half-hour at a controlled temperature of 77 degrees F., after which the final frequency measurement is made. Appropriate adjustments of the tine screws set the frequency to within 0.001% of the nominal value. The voltage coefficient of frequency is now obtained. This is approximately 0.005% per volt. The output voltage and harmonic content are then measured.

The forks are then placed in stock. When orders are received the forks are returned to the laboratory, and the frequency is measured at a driving voltage of exactly four volts. A calibration certificate, showing the exact frequency to within 0.002% at a stated temperature between 70 and 80 degrees F., and showing the temperature and voltage coefficients of frequency, is supplied with each fork.

## GENERAL RADIO COMPANY

CAMBRIDGE, MASSACHUSETTS

Branches in New York and Los Angeles